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EDITORIAL

Telephone Leaders Back Manufacturers That telephone leaders recognize the problems confronting the Independent telephone manufacturer and fully realize his importance in the progress of the Independent telephone industry is proved by the statements of executives of State Associations and directors of the United States Independent Telephone Association on pages 20 and 21, 24 and 25 of this issue of TELEPHONE ENGINEER.

These men, in urging telephone companies to buy all the equipment and to make every improvement that is possible at this time, realize that the research, engineering and development work of the manufacturer is absolutely necessary for the continual growth of the Independent telephone in-

dustry. And they know that to continue this vital work the manufacturer must have every bit of business operating companies can give him.

Progressive telephone men know that in order to provide their subscribers up-to-date, modern and efficient service in the future depends on the extent to which the manufacturer is able to provide equipment to render this service—they are aware of the fact that this means continued research and experimental work, which the manufacturer can not continue unless he is getting sufficient business.

TELEPHONE ENGINEER congratulates these men for recognizing their responsibility to their industry in supporting the manufacturer and we want to thank them for presenting their true and unbiased opinions on the subject.

It is a recognized fact that public confidence is greater today than it has been at any time in the past few years and that there is no sound reason why business should not make rapid strides forward.

For months, enterprise has been suspended, pending some assurance of the policies of the new administration. Now that President Roosevelt has acted promptly and vigorously and the specter of fear has been laid, there is no reason why business men who have deferred buying should not begin to make up for lost time.

With confidence restored the telephone companies would seem to be in a most enviable position. Telephone service was so valuable that it was one of the last things to be cut off and for that reason it is logical to believe that it will be one of the first to be restored by the public. Why then would it not be logical for telephone executives to make necessary improvements in their plants and prepare for the increase in general business, which is being predicted by leading economists.

Buying equipment and supplies for needed improvements now would not only mean that telephone companies would be showing foresight, but, they would be making a wonderful and vital contribution to their industry—that contribution being in the form of their support to their manufacturer.

The telephone industry is the greatest industry in the world, but, the greatest of all things often times needs a stimulant. The telephone industry needs one. As in the past the only sure stimulant today is the close cooperation of operating company and manufacturer. It behooves every telephone man to give his best now as he always has in the past.

An Outsider's Viewpoint In one of its editorials, discussing "Advertising Opportunities for the Public Utilities," Advertising Age has so forcibly brought out the policy fostered by TELEPHONE ENGINEER that we are publishing a portion of the editorial.

This editorial clearly points out the opinions and viewpoints of individuals looking into the public utility business from the outside.

Referring to the duty of individual operating companies in the task of building satisfactory public relations in their communities, the editorial says:

"They are the direct points of contact with consumers, and under today's conditions the sentiments of the general public and of consumers of utility services must be given first consideration.

"The development of a sound public relations policy in the utilities field may be regarded as the most important task that rests upon the management of each operating company. Only through the consistent cultivation of a relationship resting upon good service and reasonable rates can the future success of the utilities be assured, and the enormous stake which they have in public good-will emphasizes the opportunities which offer themselves to advertising of the right kind, aimed to present the policies and methods of the utilities frankly and openly for public consideration.

"Concealed propaganda and lobbying has not had the effects which were desired. In many cases opposition has been aroused which would have been completely disarmed had the issue been met in the open, and had the public been given completely the views of the utilities on such subjects as merchandising, rates, etc. . . . .

"The best basis for discussion of legislation is full information to the public, for a public which has been given the facts is seldom radical to the point of unfairness. Restrictions on selling operations, as well as with reference to rates, are based in most cases on the belief that the utility is attempting to operate unfairly. Advertising that presents all the facts to all the public will make extreme legislation and hampering restrictions far less likely."

Announcing A Change We trust that our readers will approve of the change in type and headline style, appearing in this issue of TELEPHONE ENGINEER. As every industry changes its products from time to time—so does the publishing industry. With this thought in mind we inaugurate the change in makeup of our publication.

Make Your Plans To Attend The
NATIONAL CONVENTION
July 11, 12, 13, 14
and the
WORLD'S FAIR
At The Same Time

BELL SYSTEM EXHIBIT AT WORLD'S FAIR

By
JOHN MILLS
Director of Publication
Bell Telephone Laboratories

THAT 1933 is the centennial of Chicago is the occasion for an international exposition—a "World's Fair"—which opens in that city on June 1. The past century, however, has a wider significance, and this the promoters symbolized in their choice of a name—*A Century of Progress* International Exposition. As they express it:

> In the hundred years of Chicago's existence, science has entered world industry and wrought amazing changes in everyday life. At the beginning of this era, man groped wildly for those laws which would enable him to mould the forces of Nature to his use and comfort. Today the results of that mastery of man over Nature are evident in new means of transportation, in new methods of communication, new products that make our lives more comfortable, healthful and safe.
>
> A Century of Progress International Exposition will tell by easy stages and in simple form the story of scientific discoveries and inventions based on those discoveries, their application to industry and the resultant transformation that has made the world of today so different from the world of a century ago.

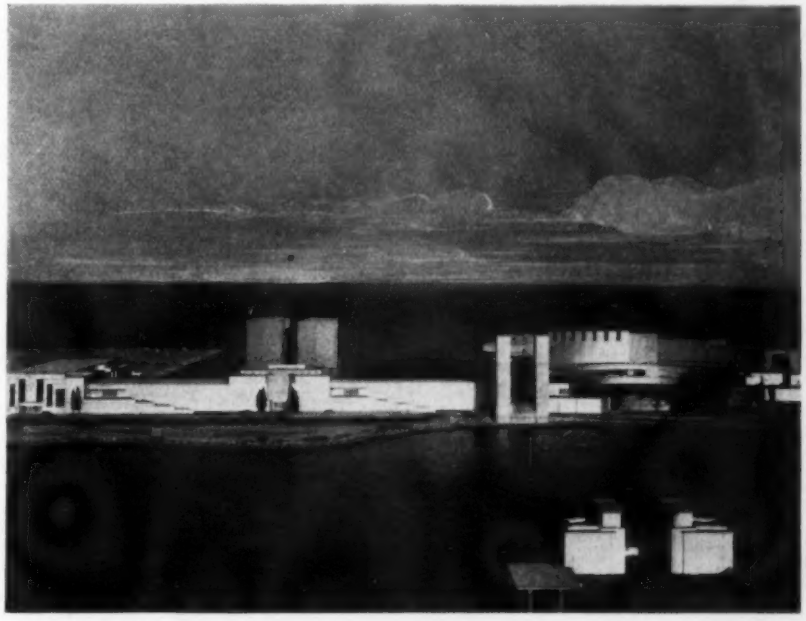
When the trustees of the Exposition, of which Rufus C. Dawes is president, decided that the Century of Progress should depict "the contributions of pure and applied science to industrial development during the last hundred years" as its main theme, they returned to the National Research Council for advice and assistance in formulating and developing that theme. The National Research Council, which is a co-operative organization of eighty national societies in the fields of science, engineering, and industrial technology, accepted the invitation and formed for that purpose a Science Advisory Committee with Dr. F. B. Jewett, Vice-President of the American Telephone and Telegraph company, as its chairman. The presidents of a number of national societies were invited to appoint eminent men from their memberships to serve as individuals on that committee.

This advisory committee, which thru subcommittees expanded ultimately to include over four hundred members, represented the specific fields of science, engineering, and technology. Its studies, which were both extensive and detailed, resulted, after several months, in thirty-four complete reports covering the broader fields. These reports furnished the material for the basic plan and philosophy which the Science Advisory Committee submitted to the exposition authorities. With the acceptance of its report, early in 1930, by the Exposition Trustees, the basic plan and philosophy of the Exposition became fully indicated. There remained for the Exposition itself the practical and financial problems (which were, of course, enhanced by the increasing economic depression) of the embodiment of this philosophy in buildings and exhibits.

This exposition, incidentally, differs from its predecessors in being privately financed, not supported by subsidy from national, state, or city government, and not dependent upon government financial help. Its initial funds were raised by bond issues which were subscribed to by private individuals and local business enterprises. Those funds represent the confidence and community spirit of Chicago citizens. By that means were assured the construction of certain general buildings and exhibits and the operation of the Exposition. For the balance it was set up on a pay-as-you-enter basis where buildings were planned to meet the needs of various groups of exhibitors and were constructed as the leases were signed for the rental of their exhibit areas.

Foremost in the program of the Exposition, and of its advisors, was the construction of a vast Hall of Science which should house exhibits depicting the fundamental laws and phenomena of the various basic sciences. The building was one of the first erected and its scientific exhibits are, in general, to be arranged and paid for by the Exposition.

Starting from such a "temple of science" it was proposed that there should be grouped about it other buildings, representing industrial applications of the various sciences, with space leased to corresponding industries which would install appropriate exhibits. The first to be erected of these buildings representing applied science is an enormous framework, with a room suspended on a catenary construction of cables, which



The Electrical Group as Viewed Across the Lagoon from the Hall of Science. The Towers which Appear in the Central Background Enclose the Communication Court.

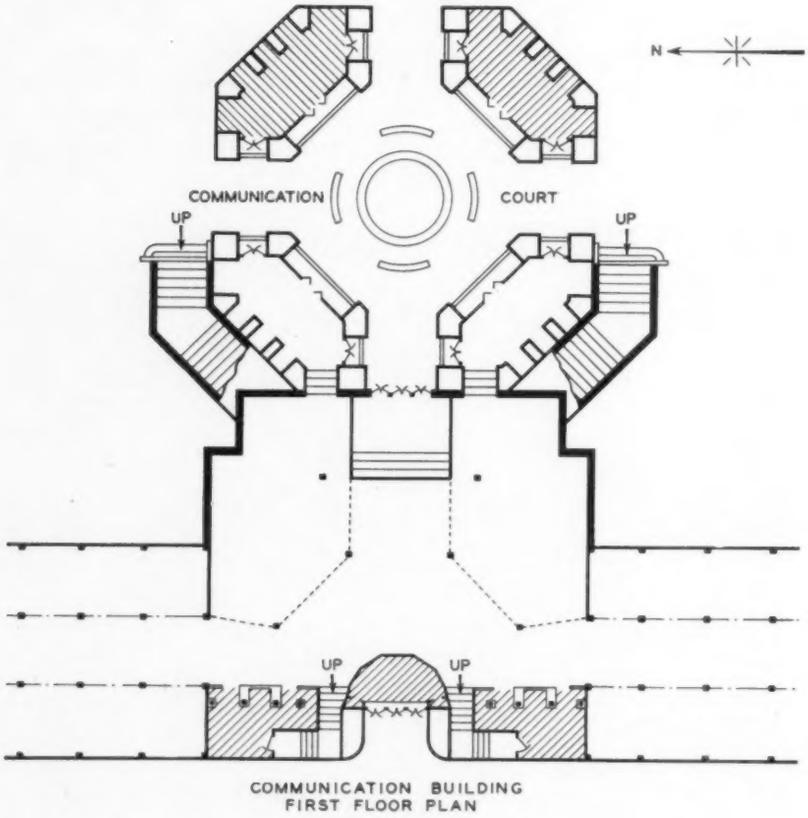
is known as the Travel and Transport Building. The next to be erected was the electrical group. This was made possible by assurances of the major executives in that field that their organizations would take space and operate exhibits.

The central portion of this electrical group, which forms a long building of three interconnected sections, is the Communication Building. In this the Bell System, the Western Union Telegraph company, and the International Telephone and Telegraph company agreed to co-operate in maintaining an exhibit of the art of electrical communication in keeping with the philosophy of the exposition.

The Communication Building will house exhibits of *two-way* communication. The amusement applications of communication techniques, whether of radio broadcasting or of sound pictures, are to be located elsewhere. The technical unity of the communication arts, which arose from the inventions of Morse and Bell, their worldwide importance and service, the essential co-operation which communication implies and communication companies practice —all this, it is hoped, will be felt by the visitor to the Communication Building. Although there will be no exhibits in common and each of the three companies will occupy its own assigned space, there will be evident in the choice and arrangement of exhibits and the architecture of the building—particularly in its centrally located communication court —something of this underlying spirit of communication.

The Exposition, which is located on the lake front of Chicago, extends from about Twelfth to Thirty-first Streets. It occupies several hundred acres, reclaimed from Lake Michigan. It lies to the east of the Field Museum and Soldiers' Field, and extends south of that stadium on the east side of the Lief Ericcson Drive. A large part of the ground is essentially an island which extends south from the Adler Planetarium, enclosing with the mainland an attractive lagoon.

The Hall of Science is located on the mainland, and on the island directly across the lagoon from it is the electrical group. A bridge connects the two buildings, starting from the second floor of one and ending on the second floor of the other, but with ramps at either end to the ground level. One of the accompanying pictures shows the electrical group as viewed from the Hall of Science.



Plan Showing First Floor and Pavilions of the Communication Building. Shaded Areas are Exhibit Areas of the Bell System.

In the general picture of the Fair grounds the electrical group can be located by the connecting bridge, although in the picture it is partially hidden by a huge tower. These towers were not included in the original artistic visualization of the Exposition grounds, and there is some divergence of opinion as to whether they add or detract from the general appearance. The towers, which are now in the course of erection, are the terminals for a ride across the lagoon at a level of 200 feet. They will be about 600 feet high and at their tops have observation platforms and restaurant facilities.

The Communication Building has eight different entrances, and only a good guess can be made at present as to which will prove the most popular. The building, plans of which are shown in an accompanying diagram, consists really of two parts: one portion forms a continuous part of the electrical group, and the other, consisting of four separate high towers, forms a court or formal garden on the like side of the main portion of the building.

These four towers, of rough concrete, run up about 110 feet. They will probably be colored in green and in effect form huge "trees" enclosing a quiet space which will be the "Communication Court." The towers are about twenty feet apart and the court may be entered from the north, east, or south. In the center of the court is a shallow pool for which a tile bottom is being constructed bearing a design symbolic of the speed and world wide range of electrical communication, and on the border the names of the three industries. The towers will be colored and specially illuminated at night, and the quiet center which they form on the lake front should prove very attractive. In the base of each tower is a pavilion of about 700 square feet area.

The northwest and southwest pavilions connect directly with the adjacent exhibit areas in the main building. Between these two pavilions, as shown in the accompanying floor plans, there is a wide entrance on the first floor of the Communication Building. Broad winding stairs also lead around the outside of the two western towers to the second floor of the main building from which there is another entrance to the building.

In the division of space between the American Telephone and Telegraph company, the Western Union Telegraph company, and the International Telephone and Telegraph company, the two eastern pavilions were taken by the Bell System, the northwest by the Western

(*Continued on page 27*)

ENGINEERING & MANAGEMENT COURSE

By
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Section 3—Automatic Exchange Practice. Section 3.2—Basic Elements of Strowger Automatic System.

Basic Elements of Strowger Automatic Exchanges—Line Switches

RESUMING our discussion of the basic elements of the Strowger Automatic system which was started in the January 1933 issue of Telephone Engineer.

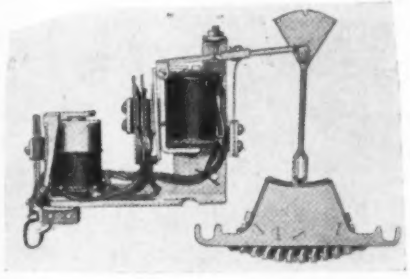


Figure 1. Plunger type line switch.

In a manual common battery exchange when a subscriber removes the receiver from the hook switch, a lamp lights in front of an operator indicating the subscriber's desire to make a call. The operator picks up an answering cord and plugs into the jack associated with the incoming signal and takes the subscriber's number, the calling cord is then used to connect to the called number.

In an automatic exchange of the Strowger type when the calling subscriber removes the receiver preparatory to making a call, a device known as a **line switch** automatically connects the calling subscriber's telephone line to one of the step-by-step switches described in the January 1933 issue of Telephone Engineer.

The line switch accomplishes automatically what the operator does manually when she connects the subscriber's line to one of the several cord circuits she has available. The line switch of course operates the instant the receiver switch hook contact in the calling subscriber's telephone is closed, while in the manual exchange the operator must first visually observe the incoming signal, and then plug an answering cord into the calling jack.

There must be one line switch for every subscriber, however, there need be only as many step-by-step selector switches (for each digit) as there are cord circuits in a manual exchange.

The step-by-step switches are common to the exchange and can best be understood by thinking of them as we would cord circuits in a manual exchange.

The heavier the traffic the more step-by-step switches will be required, for the same reason that more cord circuits are required in manual exchanges with increased traffic.

Figure 1 illustrates a plunger type line switch with operating relays and bank contacts.

Now that we are familiar with the two basic pieces of equipment used in a Strowger Automatic System let us see how a call would be handled in a small 1000 line exchange.

Basic Operation of Small Automatic Exchanges

Figure 2 shows schematically the various apparatus units, and sequence of a call passing through a small automatic exchange.

It will be observed that there are three essential units involved in a call, viz: the line switch, the step by step selector, and the step by step connector.

When the calling subscriber's receiver is removed preparatory to making a call, the line switch connected to the telephone automatically plunges into a bank of contacts which connects the calling subscriber's line to one of ten trunks terminating in step by step switches which are known as first selectors. The term "trunk", as used in the telephone field, means a wire path between two points which can be used for signalling and talking purposes by a number of different lines.

Figure 2. Schematic diagram showing path of call in small Automatic Exchange.

In order that individual selectors (which are relatively expensive) will not be required for each subscriber's line, the line switches are mounted in four groups of 25 each and so arranged that a device known as a master switch can keep the line switches which are not in use constantly before an idle trunk. By having approximately ten trunks leading to ten selectors available for the use of each one hundred subscribers, the subscribers would get practically as good service as if there were an individual selector for each subscriber. It should be noted that the problem of providing selector switches is identical with that in the manual exchange of providing cord circuits. A separate cord circuit is not set aside for the use of each subscriber, and only enough cords are provided to care for the maximum traffic load to be expected under normal conditions.

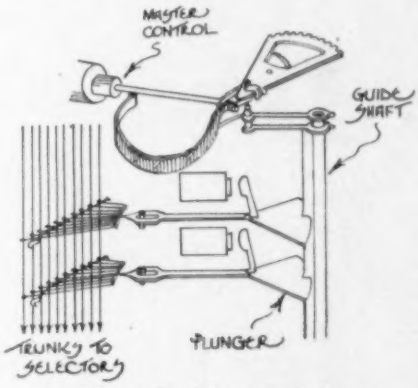


Figure 3. Master switch.

Figure 3 illustrates how a master switch rotates line switch plungers so as to keep them always before an idle trunk.

By the time the subscriber starts to dial the first digit of the number being called the calling line has been automatically connected to the first selector (the hundred's selector) so that the dial impulses causes the step by step mechanism to move up in a vertical direction to the called hundred. Arriving at the desired hundred, the wipers are then automatically stepped in until they reach an idle trunk leading to the connector. At this point they stop and the subscriber's line is automatically connected through to the connector switch.

When the subscriber dials the next digit of the called number the step by

step mechanism of the connector switch is stepped upward to the desired ten's but does not rotate in automatically as was the case in the selector switch. When the last digit is dialed the con-

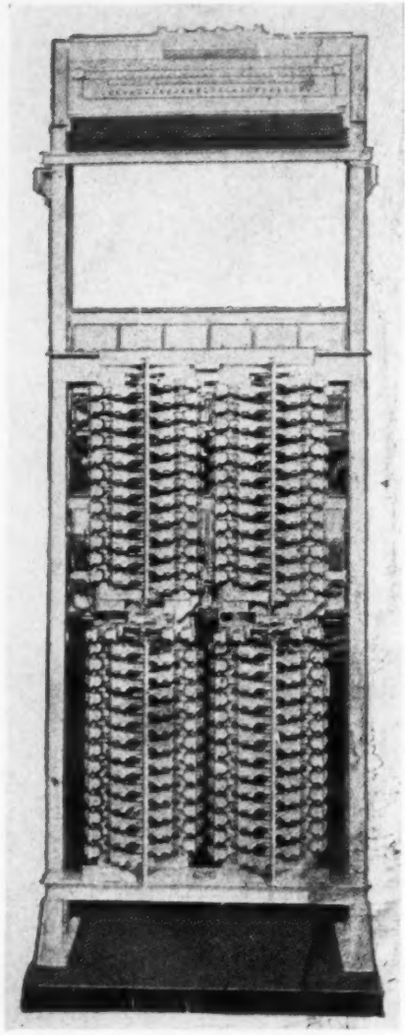


Figure 4. Line Switch Board.

nector switch rotates the wipers in under control of the subscriber's dial to the bank contacts to which the called

Figure 5. Group of Selectors.

subscriber's telephone is connected. Relays automatically connect ringing current to the called bell, which will intermittently ring until the called subscriber answers, or the calling party hangs up.

The line switch, selector, and connector are all held in the operated position until the calling subscriber hangs up, at which time they all restore to normal, relieving the selector and connector for the use of other subscribers.

The connector switch in an automatic exchange must take care of all the functions of completing the call such as testing the called line, ringing, reporting busy lines, etc.

The selector switch selects the desired office, thousand, and hundred of the called number.

The number of selectors and connectors required in any exchange depends upon the peak traffic, usually from 5 to 20 selectors and connectors are required for each 100 subscribers' lines.

If insufficient selectors or connectors to care for traffic are provided the calling subscriber would receive a busy signal when they were all in use.

Equipment Details

Line switches of the plunger type are mounted usually 100 in a board with

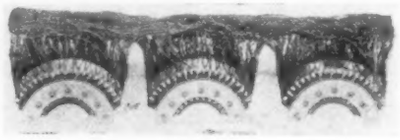


Figure 6. Bank Multiple.

one master control switch. Figure 4 illustrates a line switch board.

Selectors are mounted in rows as shown in Figure 5. There being usually 20 selectors in a row, and the racks having a total capacity of 240 selectors.

The bank contacts are multiplied together as shown in Figure 6, and the multiple terminated on a strip at the end of the rack, where changes in trunk assignment may be conveniently made without disturbing the switch wiring.

Connectors are mounted together in connector boards which are usually glass enclosed in order to keep out dust.

Other Types of Line Switches

Another type of line switch which is somewhat more efficient than the plunger type and which is now being used in new installations is known as the "self-aligning" type. The principle advantage of the new line switch over the old is the fact that it will immediately align itself with the master guide shaft when released on the completion of a call, whereas the old plunger type would not restore to normal until picked up by the master guide shaft.

The chief difference between the new and old line switch is the addition of pivoted arms which snap the line switch plunger back in place on the guide shaft whenever the switch is released from use.

Still another type of line switch which is used in many automatic ex-

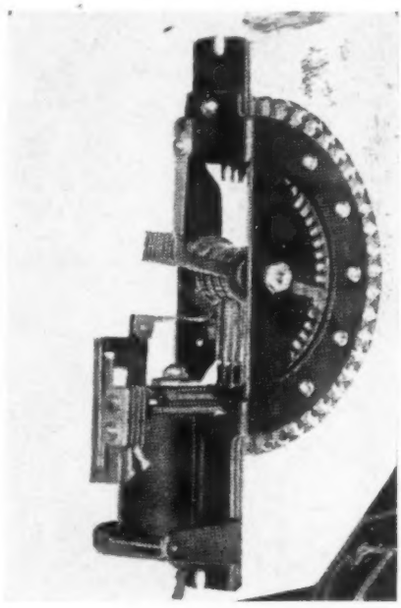


Figure 7. Rotary Line Switch.

changes is the rotary type. The rotary line switch differs in principle from the plunger or self-aligning type in that it is a complete unit in itself and does not require a master switch to enable it to select an idle trunk.

Figure 7 illustrates a typical rotary type line switch.

It consists essentially of a set of wipers arranged to rotate in contact with a semi-circular bank of contacts, and which are rotated by means of a

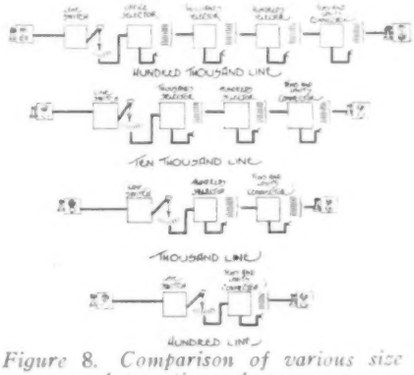


Figure 8. Comparison of various size Automatic exchanges.

panel and ratchet one step at a time by a stepping magnet.

In conjunction with a line and cut off relay the rotary line switch accomplishes the same function as does the plunger line switch and associated master switch.

Multi Office Exchanges

From the previous discussion of selector and connector switches it is ap-

(Continued on page 35)

TESTING CABLES UNDER GAS PRESSURE

By
W. C. DILLON
Telephone Development Engineer

Value and methods of testing cables with nitrogen gas is outlined in this educational article. Importance of having solder at the correct working temperature for stirring and wiping cable joints in conjunction with the use of gas also is pointed out.

THE rapid growth of the telephone and telegraph industry has naturally followed a tremendous increase in the use of new methods to improve communication.

Extension of the toll cable net-work, wherein many hundred telephone and telegraph messages are carried within a lead-antimony cable sheath, has necessitated new construction intended to lessen service interruptions, caused by the opening of this lead sheath, which, of course, would permit dampness and sometimes putting out of service a complete cable.

With the aid of oil pumped nitrogen gas, cable valves and plugs, it has become possible to determine the location of sheath openings before they result in a failure.

Oil pumped nitrogen gas is supplied by the manufacturer in loaned cylinders, which contain a little over 200 cu. ft. at a pressure of 2,000 pounds per square inch, at 70 degrees F. cylinders commonly known to contain 200 cu. ft., in reality contain 205.77 cu. ft.

The height of the large 200 cu. ft. cylinder over-all is 56", and the diameter 8¼". The weight of the 200 cu. ft. cylinder full is approximately 135 pounds.

Test 8 or 9 Sleeves

In order that small amounts of nitrogen gas be available for testing single splices, as is the case when a splicer has worked on an existing cable, a small 26 ft. cylinder is used. This size cylinder contains sufficient gas to test 8 or 9 sleeves. These small cylinders are filled from a battery of the large 200 cu. ft. cylinders. The 26 ft. cylinders are located at the splicer's supply base.

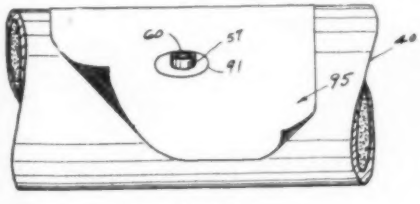


Figure 1.

A regulator, for both the 200 cu. ft. and 26 ft. cylinders, is designed to screw onto the standard ¼" left hand threads of the cylinder valve. The regulator consists of regulating valve for controlling the high pressure gas down to ounces, a 50 lb. gauge for reading this pressure, and 3,000 lb. gauge for registering the cylinder pressure. The scale of this latter gauge is also calibrated into cubic feet at atmospheric pressure,

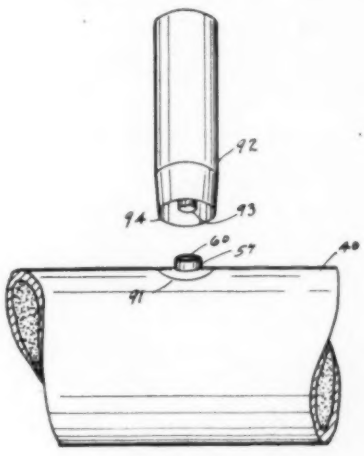


Figure 2.

in order to determine the amount of gas in the cylinder at all times.

A rubber hose from the regulator provides a means of conducting the gas, with the aid of a valve chuck, to the cable work.

To those not familiar with using nitrogen gas in cables, these are a few of the reasons why nitrogen gas is used. Porous or faulty joints, sheath breaks, which occur in both aerial and underground cables, usually cause considerable trouble, and are often attributed to one of the following:

In aerial cables
- Porous joints
- Faulty solder work
- Bullet holes
- Rodents
- Blasting
- Expansion and contraction causing buckling and bowing.
- Ring cuts
- Poor workmanship
- Manufacturing defects
- Deterioration of materials.

In under-ground cables
- Porous joints
- Faulty solder work
- Breaks caused by handling
- Corrosion of chemicals
- Manufacturing defects
- Snagging cable while pulling
- Breaks caused by road construction
- Digging of trenches
- Electrolysis
- Splicing defects.

These openings in the lead sheath and wiped joints cause trouble by allowing dampness to enter the cables.

Low Pressure Points

To locate these types of openings it is necessary to maintain isolated sections of the cable under pressure until the low pressure points, caused by the openings, can be located.

One of the reasons for maintaining cables under pressure is to prevent moisture and locate openings before serious trouble occurs. At atmospheric pressure the nitrogen gas in one 200 cu. ft. cylinder is sufficient to test 6,000 cu. ft. of full size cable. This system of pressure testing has been so effective that quite a number of important aerial and under-ground toll cables have been placed under constant pressure. After these cables have been cut into service, both ends are sealed with dams or plugs to prevent the escape of gas, and also intermediate plugs are installed at approximately 10 mile intervals to sectionalize the cable for use in locating

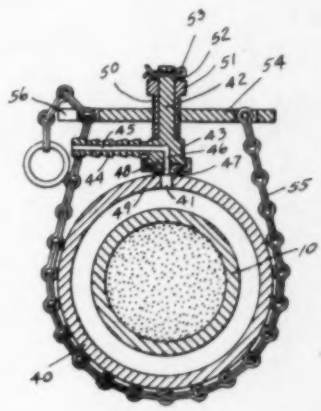


Figure 3.

sheath breaks. Gas should be admitted into the cable at the valve locations, about every other valve. Gas should never be entered near the dam. For this 10 mile section it will require 4 to 5—200 cu. ft. cylinders of oil pumped nitrogen to bring the section up to a pressure of about 12 pounds per square inch at 60 degrees F. The valve stems are located at the loading splices, which gives them a 6,000 ft. spacing.

Nitrogen gas will equalize in pressure in the cables in about twenty-four hours. Then, all soldered work is tested with soap-suds for leaks. The pressure reading at each point is taken with a gauge to fit over a "B" valve and on plotted cross-section paper, as before, the low points are then taken, which indicates sheath trouble. When it is narrowed down to one section a method described for sectional defects is used to locate the trouble.

To test the loss of pressure, after the section has been inflated, an electrical indicating gauge, associated with an alarm circuit, is placed in each 10 mile section. The circuit is usually a non-loaded pair stubbed out to a terminal, the tail of which has been plugged.

Buried Cable

With buried cable, it is desirable to terminate the pressure testing valves above the ground and mount the pressure contact terminals on concrete markers or stub poles, to provide convenient access to them. Under these conditions the contactor may be at a temperature different from that of the cable. When the contactors are at a higher temperature than the cable, caused by summer weather, operative pressure of the contactor will be higher and the margin between the cable pressure and the contactor open pressure will be less than that normally provided for aerial and underground cables. To overcome this, underground cables should be placed under pressure equivalent to about 14 lbs. per square inch at 60 degrees F. The pressure placed in underground cables should be about one pound of that specified.

In the central office or station the alarm circuit is terminated with a relay, whose local contacts operate a signal bell or lamp. When the bell or lamp operates, its contact automatically crosses the pair to which the gauge is attached. Test-board men then take a loop resistance measurement to the cross and know immediately what ten mile section is in trouble. A cable-man is then dispatched to the mile points in the section in trouble and by this method of plotting pressures he finally locates the trouble.

Pressure reading for the purpose of plotting a graph of the pressure gradient, should be the actual pressure conditions existing in the cables at that time. Pressures are charted on the vertical scale and distance on the horizontal scale. This procedure is used in locating defects in underground cables, where the sheath breaks occur in the duct line. The defect will be located between the

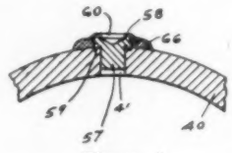


Figure 4.

manholes at which the lowest pressures are recorded. If any opening exists, the reading will show a drop in pressure at one or more points, and the section should be painted with soap-suds, if need be, to detect leaks.

On aerial cables, the locations of the openings may be found by riding the section and painting with soap-suds if necessary. If the hole in the cable is large, only a few tests will be required to definitely locate the opening. Occasionally it can be detected by the hissing sound of escaping nitrogen gas, which is harmless, and which is used for detecting sheath injuries before they result in serious break downs.

Drying Effect

The drying effect of nitrogen gas is a very important advantage when admitted in either side of a cable vault, which is wet. In some instances, pulling in and cutting over a new section of cable has been avoided and service restored within three of four hours

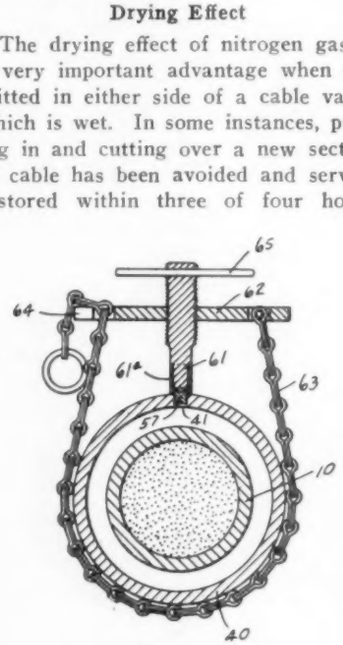


Figure 5.

after failure. Gas was applied and drying out process continued up to the time when the pulling had been completed and the section ready to cut over. Under these conditions nitrogen not only restored practically all the telephone service, but greatly aided the splicers in toning through the defective section when restored. It is reasonably certain, that only oil pumped nitrogen gas, with its absorption power can dry out completely wet cables, and avoid the expense of replacement of new cables.

Existing cables not under permanent pressure should be tested to see that they are air tight before the cablemen leave the job. This should be done by drilling a hole with a drill in the sleeve of the sheath in which the opening was made, after all the lead work has been completed.

A pressure testing clamp should then be applied over the hole and oil pumped nitrogen gas applied at a pressure of 10 pounds, and maintained at this pressure continuously while the testing work is in process. All of this new lead work, and on underground cable sheath from duct entrance to duct entrance, should be painted with soap-suds and examined closely for leaks.

By the old method of plug installation, a splicer and his helper, gassing a wiped sleeve, required approximately one and one-half hours each, (or a total of three hours for both), to allow the gas to escape that dissipated back into the cable, before they could put a plug in the cable or sleeve and successfully solder over it. It is true, they could plug the hole tight, but as soon as they applied molten solder on the plugs, the metals caused an expansion and the pressure in the cable was likely to escape through the molten solder, and not only interfere with the wiping of the joints, but blow particles of the solder, causing injury to the splicer or helper.

Brass Tin Plug

With the new method of valve plug installation, a hole through which the gas is admitted should be plugged with a brass tinned plug with a sleeve plug holding clamp and finished then for neatness with a finishing soldering iron. With the aid of the plugs and tools the hole can be plugged with safety while under pressure, without the splicer and his helper waiting the usual three hours for the gas to escape, before plugging, as was true with the old method. With the new plug and tools the hole can be plugged immediately, making a neat strong job, which can be re-opened and used over and over again whenever desired.

Figure 3 is a sectional view through the splice sleeve of a telephone cable having gassing clamp attached thereto for gassing the cable without the application of a valve. This special gassing clamp is used where the gassing where the hole, through which the is done for testing purposes only, and nitrogen gas is introduced, is to be

(*Continued on page 26*)

NEWS FROM FOREIGN COUNTRIES

SWEDEN TELEPHONES

The number of telephone subscribers in Sweden totaled 466,000 at the close of 1932 compared with 425,000 at the end of 1930, an increase of about 10 per cent, according to a report to the commerce department.

This increase was noted despite the fact many telephones have been discontinued in Sweden in the recent past, it was stated.

Figures show an average of about one out of every 13 people in Sweden operated telephones in 1932.

CZECHOSLOVAKIA

Czechoslovakia now has 157,000 telephones including about 42,000 automatic units, according to a report of the commerce department. Early in 1932 the Czechoslovak state telegraph and telephone administration conducted an educational campaign and reduced installation fees, which was successful in increasing the number of new subscribers of automatic telephone exchanges by 2,800 and subscribers to manual exchanges by 4,000 despite the severe economic depression.

TELEPHONE TEST SUCCESSFUL

Telephone communication between England and Poona, India, by means of beam wireless, was successfully tested recently, when wireless engineers talked freely to London during the experiment. A service will shortly open to the public.

AUTOMATICS INCREASING

According to official statistics there were 150,284 telephones in use in Czechoslovakia at the beginning of 1932, of which 85,616 or nearly 57 per cent were in Prague. The automatic dial telephone system, which is installed partially in Prague, Brno, Opava and Pardubice, had 39,659 telephone units including 33,405 in Prague alone. Early in 1932 the Czechoslovakia State Telegraph and Telephone Administration encouraged use of the telephone service by reducing telephone installation fees and succeeded in securing about 2,800 new subscribers to automatic telephone exchanges and approximately 4,000 to manual exchanges. This has brought the total number of telephones to more than 157,000 including about 42,500 automatic telephone units.

LINKED BY RADIO-TELEPHONE

Radio-telephone communication has recently been established between Rome and Oslo.

INCREASES CAPITAL

Kjobenhavns Telefen Aktieselkab (The Copenhagen Telephone Company), a concession company, is increasing its capital by five million crowns, from fifty to fifty-five million crowns. It is reported that the government will take up the entire issue of the new shares. The government already holds nine million crowns worth of the stock in the company, acquired in 1919 when the present operating concession was renewed. The authorized capital of the company is 70 million crowns. The funds obtained by this increase in capital will be used for the purchase of new equipment and for the completion of the rebuilding of one of the centrals. An increase of around 2000 subscribers is reported in 1932.

TELEPHONES DECREASE

The total number of telephones served by the British Columbia Telephone Company at the beginning of 1932 was 120,585, whereas at the beginning of 1933 the total was 112,794, a decrease of 7,791.

SWEDEN INCREASES PHONES

There was an increase in the number of telephones in use in Sweden in 1932, notwithstandig the fact that a large number of subscribers had their telephones removed during the year. The number of subscribers in Sweden totaled about 466,000 at the end of 1932 as against 449,000 on December 31, 1931, and 425,000 at the end of 1930. The number of subscribers in the city of Stockholm increased from 136,000 on December 31, 1930 to 143,300 on December 31, 1931, and 147,200 at the end of 1932. Thus, an average of about one out of every thirteen people in Sweden, and more than one-fourth of the residents in Stockholm, were telephone subscribers at the end of 1932.

LINKED BY RADIO

Radio and telephonic communication between Nanking and Geneva is expected shortly, as the necessary equipment is now being installed in Nanking for use of the government in communicatig with the Chinese delegates at the League of Nations.

RADIO TELEPHONE SERVICE

A regular radio-telephone service was instituted between Rome and Egypt on December 20, 1932.

DIRECT TELEPHONE SERVICE

Following a successful trial, direct exchanges of telephone messages between Seoul and Osaka, long distance public telephone service, via submarine telephone cable between Fusan and Shimoneseki, was ceremonially inaugurated, and the service opened for public use recently.

AUTOMATIC IN TRIPOLI

The work of installing an automatic telephone system in Tripoli, the chief city of the Italian North African Colony of Tripolotania, has recently been completed.

TELEPHONES IN IRELAND

During 1932 the number of telephones in use in the Free State increased by 825 to 32,445. Call offices grew in number by 40 to a total of 1,400, and the calls made increased by 25,000 to nearly 200,000. Trunk calls were made at the rate of 18,000 per month for eleven months of the year.

PHONE SERVICE PROHIBITED

The projected construction of a long-distance telephone line between Tientsin and Tsinan by the Hopei and Shantung Provincial Governments has been prohibited by the Ministry of Communications. The project is considered to be in contravention of the policy of the Government for centralized control of all telegraph and telephone enterprises.

NEWS FROM THE FIELD

The Interstate Commerce Commission has authorized the Bell Telephone company of Pennsylvania, to purchase the Forest Telephone and Telegraph company for $350,000. The latter company operates in Clarion, Forest, Venango and Warren counties, Pa.

Permission to lay a submarine cable across Columbia slough, seven-eighths of a mile above its mouth, has been requested of the United States engineers by the Pacific Telephone & Telegraph company. It is to replace an overhead cable.

S. T. Bruce of Iowa Falls, Ia., has been appointed manager for the Bell Telephone company at Iowa Falls, to succeed W. E. Bryan, who resigned and who has been business manager for the company for many years. Mr. Bruce has been with the company many years. He has been wire chief of this district since 1916. Mr. Bruce was associated with the Bell company at Burlington and Keokuk before coming to Iowa Falls.

Underground telephone cables will serve the Globe Oil and Refining company between McPherson, Kan., and the plant, where recently ditches were dug from the south city limits for nearly three-quarters of a mile south to the corner east of the plant.

The United Telephone company will install a cordless P. B. X. system at the Globe refinery as an individual telephone system for the plant. Twelve phones will be scattered throughout the refinery at convenient points so that direct connections might be made with the company's offices.

Decision to discontinue phones on the part or all of twenty-six rural lines connected with the Algoona (Ia.) exchange was made at a recent meeting of representatives of a majority of the lines.

The telephone rates of the Titonka (Ia)., Telephone company were cut at a meeting of stockholders held recently. The switching fee on rural lines was reduced to $5 a year. Residence phones are $1.25 and business phones $2.25 as heretofore.

The Farmers Mutual Telephone Exchange of College Springs, Ia., and the Coin and College Springs Star Line Mutual Telephone company (Ia.) have each filed corporation papers for a new lease under state law.

H. C. Mattson, manager of the Washburn and Bayfield exchanges of the Wisconsin Telephone company, reports that a crew of nine men has been engaged in repairing and reconstructing the telephone line between Washburn and Bayfield. It consists of relocating the line between Salmo and Chequamegon Springs and replacing the iron wire with copper wire for the entire distance between Ashland and Bayfield.

Headquarters of the New England Telephone & Telegraph company was forced to call in all available operators to handle the great rush of business that followed the orders for bank holidays. "We are operating with a full force now," said one of the officers of the company. "We have had to call in the extras to meet the situation. We have not been so busy for a long time. Not only are we working a full force but we have set up new circuits to New York and Washington."

The directors of the McNabb (Ill.) Telephone company met recently and decided to accept corn for the payment of telephone due at the rate of 25c per bushel. The corn was to be delivered to the McNabb Grain company elevator before April 1 and accepted for accounts past due and also for the dues to be paid in advance.

County and Wisconsin Telephone company officials are seeking the identity of the driver of a truck which caused considerable damage recently on Highway 55, one mile this side of Eden, Wis., by striking a guy wire supporting telephone lines extending between this city and Milwaukee. Circuits on the pole system were put out of service, according to Manager W. E. Schroeder of the Wisconsin Telephone company, however the talking circuits, which are in cables, were not affected. One telephone post was broken off.

The Minnesota railroad and warehouse commission has sanctioned voluntary reductions in telephone rates proposed by six of the smaller concerns throughout the state.

The reductions, the most of them resulting in a saving of 25 cents a month to the subscribers, were made at Harmony, Wanamingo, Grey Eagle, St. James, Kasson and Sebeka.

W. K. Collins, manager of the central division of the New York Telephone company, has been appointed Eastern division manager, with headquarters in Albany, and B. T. McCarter of Hempstead, L. I., was transferred from managership of the Long Island division to become central division manager with headquarters at Syracuse.

Regular telephone service between the United States and Central America was made available recently.

The service has been made possible through an arrangement between the American Telephone and Telegraph company and the Tropical Radio Telegraph company.

Telephonic communication between Washington and Panama City, C. Z., also has been established. Within a short time the same service will be maintained between this country and Costa Rica, Nicaragua, Honduras and Guatemala.

Continuing its policy of making adjustments to current business conditions by reducing work hours when necessary, rather than by laying off regular employees, the Southern New England Telephone company recently announced it would further extend its short time working schedule for officials and employees, simultaneously, making a basic working day of five days, affecting about 4,500 persons.

All departments of the company have been operating on a schedule of reduced working hours for the last year. Business conditions, it is pointed out, makes it necessary to continue that practice. The schedule will be made flexible in accordance with work possibilities in the various departments.

George W. Fuller, consulting engineer of Fuller & McClintock, New York, has been elected chairman of the Engineering Foundation to succeed H. Hobart Porter. Mr. Fuller is a nationally known hydraulic and sanitary engineer. Harry P. Charlesworth, vice-president of the Bell Telephone Laboratories is first vice-chairman of the Foundation.

The Mutual Telephone company has reduced its rates at Liberty Center, Ohio, $1 a month, which became effective March 1. Salaries of its employes were reduced.

Earl L. Gaines, traffic manager of the Home Telephone and Telegraph company of Fort Wayne, Ind., was elected president of the Allen County-Fort Wayne Historical Society for the third consecutive year at a meeting of the organization's directors recently.

TELEPHONE MAN PICKED BY OKLAHOMA GROUP

Oklahoma Utilities Association elects R. J. Benzel, Southwestern Bell Telephone Company president. First time in several years telephone man honored.

THE telephone industry was honored by the Oklahoma Utilities Association March 8 in the election to the presidency of that Association of R. J. Benzel, vice-president of the Southwestern Bell Telephone company. The election closed the fifteenth annual convention of the Oklahoma Association held March 6, 7 and 8, at Oklahoma City, which includes all branches of the public utility industry. The independent telephone companies of Oklahoma operate about 400 of the 550 exchanges in that state and the telephone interests of the state constitute one of the important divisions of the association.

M. J. Stooke of Oklahoma City, general manager of the Southwestern Bell Telephone company for Oklahoma, was a speaker at this year's convention. In his address he reported that in the last two years the Bell System nationally has lost 12 per cent of its telephones, 17 per cent of its local calls and 23 per cent of its long distance business. In Oklahoma the company has lost 36,000 telephones, or more than 16 per cent of its service in 1930. Other companies in Oklahoma, serving about 40 of the 550 exchanges, have also suffered great losses.

The state has 20 per cent fewer telephones now than in 1930. Long distance telephone revenues in Oklahoma have declined nearly 50 per cent. Notwithstanding these losses service has improved and expanded. Today almost any telephone subscriber in this country may talk with any of 92 per cent of the telephones anywhere, the interconnecting telephone network now being practically world-wide and including a score of the big Atlantic liners.

The Telephone Division program included talks by H. A. White, Kansas City, manager, American Automatic Electric Sales company, who justified the title of his talk "It Is Still a Good Business"; by L. J. Bullis, Oklahoma City, division commercial superintendent, Southwestern Bell Telephone company who discussed "The Place of Sales Work in the Telephone Business"; W. O. Mills, Skiatook, state superintendent, Standard Telephone and Telegraph company, who spoke on "Collections"; H. M. Stewart, Ardmore, district manager, Kellogg Switchboard and Supply company, who spoke on "A Popular Subject," reminding his hearers that the best assurance of regaining lost business and avoiding further losses is in maintaining high plant efficiency and one hundred per cent service. Walter Goggin and Al Sellers, Oklahoma City, Southwestern Bell Telephone company, gave "A Toll Sales Interview" in the form of a dialogue driving home the fact that there is no substitute for long distance service for the fully satisfactory transaction of a vast volume of business.

R. J. Benzel advised the utilities to go before their communities with the facts about their investment, revenues and expenses—through the press, by bill inserts, and by personal contacts of their employees, so that the public would understand why telephone rates could not be reduced at this time.

He further stated that telephone companies, if they are to continue in business and render efficient service, must have a fair average annual return. That in good times they were not allowed to make a profit as was done in most other businesses, but their return was held by regulatory bodies to a fair rate, and in bad times the return, due to the heavy losses of both exchange and toll business, in spite of all economies possible being effected, was at a much lower figure, and that the average return certainly could not be considered more than fair.

Mr. Benzel stated that during good times utility rates generally were voluntarily reduced, the total reductions amounting to millions of dollars in savings to the public, and that utilities generally had voluntarily, in the interest of their business, adopted the policy of charging the lowest possible rates consistent with efficiency and the financial safety of the business. That although commodity prices had been reduced, such commodities were not used in the telephone business to any large extent. Wages had been somewhat adjusted, but this economy was more than offset by increased taxes and by decreases in revenues, both exchange and toll.

He further pointed out that in twenty years the cost of Oklahoma state government has increased 500 per cent, and that in 1931 the cost of government, all units, including the cost of the federal government, was greater than the value of all the cotton, wheat and oil produced in Oklahoma.

W. L. Crittenden of the Association related interested experiences and observations with reference to telephone service in China and Japan based on a recent trip to those countries.

H. M. Hubenthal of Oklahoma City Telephone Engineer, made his annual report to the Division which gave in detail matters referred to by E. F. McKay, Association manager, in his report to the convention, who stated that work of the Division had continued as in former years covering all phases and relations between telephone company members and the governmental departments and co-ordinating the efforts of the several companies in matters in which they have a mutual interest, serious loss of business by telephone companies, large and small, having made the responsibilities of the Telephone Division the past year unusually numerous and varied.

The following officers were elected by the Telephone Division. President, R. J. Benzel, Oklahoma City, manager, E. F. McKay, Oklahoma City; chairman telephone division, J. M. Keffer, division manager Southwestern Associated Telephone company, Shattuck; secretary telephone division, C. M. Tuggle, manager, New State Telephone company, Roosevelt.

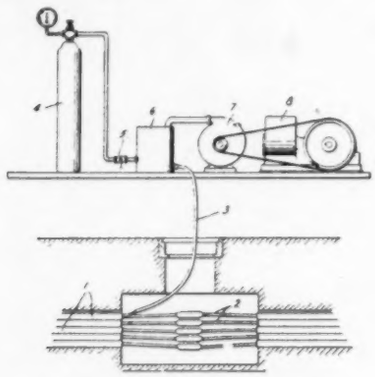
The following were elected to the executive board of the telephone division: R. J. Benzel, vice-president, Southwestern Bell Telephone company, Oklahoma City; C. G. Gardner, Sentinel Rural and Long Distance Telephone company, Sentinel; M. O. Mills, division superintendent Standard Telephone and Telegraph company, Skiatook; A. G. Davidson, district manager, Southwest Telephone company, Frederick.

H. W. Hubenthal, Oklahoma City, was elected engineer of the telephone division.

THE LATEST TELEPHONE PATENTS

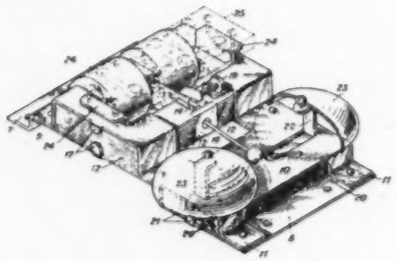
By BEN J. CHROMY
Patent Attorney
Washington, D. C.

1,896,478. TREATING WOOD AND PREVENTING CORROSION OF CABLES. Robert M. Burns, Brooklyn, N. Y., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a Corporation of New York. Filed Aug. 18, 1928. Serial No. 300,545. 2 Claims. (Cl. 247—1.)



1. The method of treating underground conduits containing or designed to contain cables sheathed with lead compositions and also containing substances promoting deterioration of the sheath for the purpose of preventing deterioration of the sheath by corrosion which comprises passing ammonia gas through the conduit.

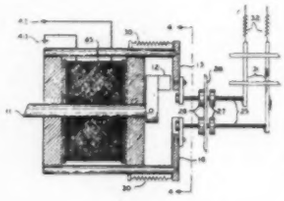
1,896,196. TELEPHONE SUBSTATION APPARATUS. Irving W. Green, Cranford, N. J., assignor to American Telephone and Telegraph Company, a Corporation of New York. Filed Feb. 5, 1931. Serial No. 513,712. 6 Claims. (Cl. 177—7.)



4. A mounting for telephone substation apparatus comprising a supporting plate having a portion bent into the form of a flat U with mounting flanges extending substantially at right angles from the legs of the U, one of said flanges being longer than the other, an auxiliary plate having a portion bent into the form of a flat U of less width than the U of the supporting plate and having right-angular extensions from the legs of the U, one of which is longer than the other, the U-shaped member of the auxiliary plate being mounted upon the flat part of the U of the supporting plate to form a compartment, the long angular extension of the auxiliary plate being extended over the long flange of the supporting plate and then bent downward to meet the edges of the long flange of the supporting plate to form a second compartment, a condenser mounted in said second compartment, a ringer having its core mounted in said first compartment, coils mounted upon said core, said U-shaped members being cut away to accommodate said coils, the long right angular extension of said auxiliary plate having tongues cut therefrom and bent to form integral supporting posts for the gongs of the ringer, and tongues cut from the plate portion of the U of said auxiliary plate and bent to form brackets to support a terminal plate.

1,898,762. SELECTING SYSTEM USING A SINGLE MAGNET. Allison A. Clokey, Rutherford, N. J., assignor to International Communications Laboratories, Inc., Newark, N. J., a Corporation of New York. Filed Oct. 31, 1931. Serial No. 572,363. 6 Claims. (Cl. 178—52.)

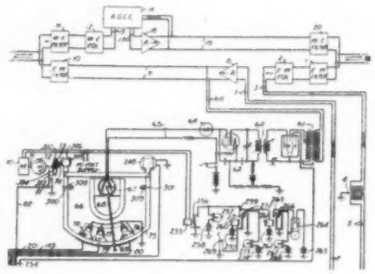
1. In a magnetic distributor, the combination of an electromagnet having a stationary winding and a moveable pole piece, a plurality of armatures for said magnet and a shaft forming a portion of



the magnetic circuit of said magnet for rotating said pole piece into operative positions relatives to said armatures for successively controlling their operation.

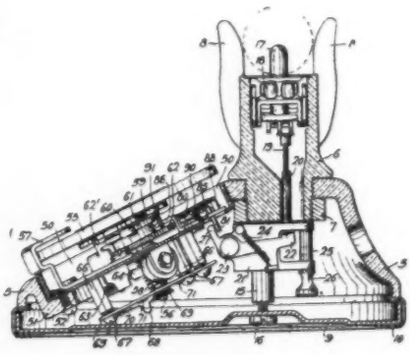
1,880,880. REGULATING CIRCUITS. Roy W. Chestnut, Upper Montclair, N. J., Donald M. Terry, Elmhurst, N. Y., and Walter F. Kannenberg, Lyndhurst, N. J., assignors to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York. Filed June 26, 1929. Serial No. 373,762. 18 Claims. (Cl. 178—44.

1. The method of regulating a characteristic of an electrical circuit which consists in setting up electrical paths in accordance with the condition of said characteristic and periodically and only at times intermediate and differing by



an appreciable interval from, the times of the successive setting up operations transmitting currents through said paths to effect the desired adjustment of said electrical circuit.

1,894,828. SUBSTATION TELEPHONE SET. Herbert F. Obergfell, River Forest, Ill., assignor, by mesne assignments, to Associated Electric Laboratories, Inc., Chicago, Ill., a Corporation of Delaware. Filed April 27, 1931. Serial No. 533,052. 13 Claims. (Cl. 179—99.)



1. In a substation telephone set, a switching member, a calling device, means for operating said calling device anl locking it under control of said switching member, means for operating said switching member to release said calling device to permit to restore to normal, and means for preventing said switching member from interfering with the restoring motion of said calling device until it reaches its normal position.

LINE and DESK

Ray Blain, A.I.E.E., Editor

Q.—Is it considered necessary to equip unexposed cables with regular protectors in the central office?

A.—It is usually considered a good plan to equip all cable pairs entering a central office with standard protectors. All pairs and lines which are not exposed to electrical hazards over their entire length may have their central office protectors equipped with wooden blocks and dummy heat coils. Practically all buildings where telephones are installed these days, are wired for electric lights and it is most difficult to class any telephone line as unexposed and perhaps best to always play safe and equip all cable pairs with standard central office protectors.

Q.—What is the principle of the line finder type automatic telephone system?

A.—The principle of the line finder system is exactly the reverse of the lineswitch system, though the purpose of both is to concentrate traffic over a much less number of numerical switches than subscribers lines. The lineswitch system requires that each subscriber's line be terminated on a lineswitch which automatically selects an idle numerical switch, while the line finder system, relays somewhat like the line and cutoff on a manual system, are associated with each subscriber's line and when operated, cause a finder switch which is permanently connected to the numerical switch, to seek and connect to the calling subscriber's line.

Q.—Is the push brace instead of a guy considered satisfactory on modern telephone construction?

A.—A push brace may be considered satisfactory to take care of a strain in one direction or where it is difficult to obtain space for guying either direct or on a stub. The push brace may also be used where it will handle the strain and prove more economical than the regular guying method.

Q.—When line and cutoff relays are mounted on a rack in the terminal room is it advisable to cover them with a panel cabinet similar to that of a switchboard to provide better protection from dust?

A.—Manufacturers of telephone equipment have spent large sums of money developing dust proof covers and the ones now used by all of them are considered adequate. The cabinet suggested, would at best be inconvenient, cumbersome and a needless expense.

Q.—How should the parallel type drop wire be spliced?

A.—First remove the outer braid for a distance of ten or twelve inches. An ordinary knife can be used for this purpose but care must be exercised to avoid damage to the rubber insulation of the conductors. An inexpensive braid stripper can be purchased which makes this operation a simple matter. The rubber fin which joins the insulation of the two conductors should be cut for about ½ inch with diagonal pliers. It is then possible to pull the two conductors apart for the distance the outer braid has been removed. The conductors may then be spliced in the usual manner. Each splice should be taped separately at first with rubber and then friction tape. The entire splice should then be covered with two reverse layers of friction tape to compensate for the outer braid which has been removed.

Q.—Please describe the proper method of polishing the carbon electrodes when repairing telephone transmitters.

A.—When carbon electrodes are excessively pitted it will generally prove desirable to replace them with new ones as they are comparatively inexpensive. When only slightly pitted they can be polished on a rag buffing wheel by using Jewelers rouge or other mild abrasive.

Q.—What sized messenger strand should be used on various sizes of aerial cable?

A.—The type of strand and the kind of cable used should always be considered. The following is given which is intended to meet the average condition, for 22 ga. cable of the sizes most commonly used; Cable 150 pair or smaller 6000 pound strand; 150 to 400 pair, 10,000 pound strand; larger than 400 pair, 16,000 pound strand. The 10,000 pound strand meets most requirements for aerial construction these days and only a small saving can be realized by using the 6,000 pound strand so its selection should be only after careful consideration.

Q.—When it is impossible to locate the ringer box of a desk stand telephone on a desk to provide proper cord length is it permissable to use an extra long cord?

A.—Cords of extra length usually cause more trouble than the standard length and their use never recommended from a maintenance standpoint. When a desk stand bell box cannot be located so as to give proper cord length it is a good plan to install a three conductor block in the proper location and connect the standard desk cord to it. Then run three conductor house wire from the ringer box to the connecting block.

Q.—Should insulated joints always be placed at the junction of aerial and underground cables?

A.—There is no need of insulating the sheath of aerial cable from that of underground unless made necessary for electrolysis or other good reason.

Q.—How can an aerial messenger strand on an old cable lead be tested so that its safety can be assured when necessary for a lineman to work on it?

A.—A good safe test is to throw a rope over the center of a span and let two men swing on it a few inches from the ground. If the messenger will support two men in this manner it is reasonable to believe that it is safe for one man to work on.

Q.—When several underground cables enter a central office should they be bonded together?

A.—All cables entering a central office should be bonded together as near the main frame as possible and then connected to the office ground.

Q.—How can 24 ga. cable be used instead of fuses for central office protection?

A.—Some companies make use of a 6 or 7 foot section of 24 ga. cable to

(*Continued on page* 30)

"Back Your Manufacturer," Is Sloga

What does the Independent telephone manufactu
telephone industry?

How can the telephone man help the manufactu

Why should the telephone executive support the n
sary equipment for long needed improvements?

**THESE questions are clearly and definitely answe
pages. TELEPHONE ENGINEER, realizing th
ent manufacturer in our industry and being fully a
dire need of business today to enable him to carry
development and to furnish an adequate source of su
presidents of State Associations and directors of t
Telephone Association. They, as operating men, ha
presented their views on the subject.**

**TELEPHONE OPERATING MEN, your man
and cooperation. On his behalf, TELEPHONE
mediate consideration and action in placing orde
supplies at once.**

National Association Urges Buying Now

By
F. B. MacKINNON
President
U. S. Independent Telephone Ass'n

THE United States Independent Telephone Association for over a year has been endeavoring to impress upon its member operating companies the necessity of as general support as can be given to the manufacturing companies.

At our conferences held last Fall in Columbus, Ohio, and Des Moines, Iowa, we emphasized this necessity. The manufacturing companies are essential to the continued life of the operating companies and we are anxious for every operating company that can to make purchases now for its Spring and Summer work.

The plants must be maintained at the highest point of efficiency that is possible and to maintain them so requires some purchases of material and equipment.

Prepare For Revived Business, Buy Now

By
FRANK A. KNAPP
Director
U. S. Independent Telephone Ass'n

IN MY opinion, there are several reasons why telephone companies should purchase supplies and material from telephone manufacturers and do it right now.

Prices of these supplies and equipment are at the lowest point and their money can now purchase the maximum amount. Replacements of plant and general rehabilitation work can be done better now than at any other time, and our facilities will then be ready for the reconnected business which is sure to come with revived business activities.

Practically all telephone companies have set up regular depreciation charges during the past three years. This depreciation reserve is absolutely necessary for the operation of telephone property but it must be used for the purpose for which it is set up, and being the replacement of plant if our plant value and rate structure are to be maintained.

From the beginning of Independent telephony, the Independent manufacturers have stood solidly behind the Independent telephone companies. It is now our duty, both to ourselves and the manufacturers, to purchase supplies and equipment from them now.

Must Stand and Pull Together

By
B. L. FISHER
Director
U. S. Independent Telephone Ass'n

I REALIZE the importance of the manufacturer and the operator standing and pulling together. I know that without the manufacturer there could be no operators, yet I believe that there is a condition that many of the operators have not as yet considered. Many plants have gone about as long as they can without one of two things happening. The service becomes very poor or repairs must immediately be made.

Where such conditions exist, there will probably never be a better time than right now, to get the much needed repair work done, because both labor and materials can now be had at a very low price.

I know times are hard and money scarce, yet the public in its present highly nervous state of mind, really demand a faster and better service than when things were running smoothly. Realizing this fact we have been persistently on our toes to give the very best service.

If we as operating telephone companies did the things that are now best for us, we would be making it more interesting for the manufacturers.

Help Manufacturer by Selling Service

By
DR. C. L. JONES
Director
U. S. Independent Telephone Ass'n

FOR twenty years past we in Athens, O., have carried on an aggressive campaign of maintenance and improved equipment conditions and today finds our plant in a highly efficient operating condition with the advantages accruing from good service to hold up our subscribers' list.

A rapidly deteriorating plant forms a poor basis for a campaign by which a company hopes to justify present rates.

For the past three months we have run a series of advertisements in our local papers, showing why our present rates are justified. So efficient have these ads been that many are asking when the rates will be raised.

The facts are, that the subscriber finds out if a company is neglecting its service maintenance. Numerous interruptions and poor transmission convinces him so very decidedly that that is the case.

I know of many properties that should buy liberal amounts of material at this time while costs are low and should actually strive to improve their service. They must do this if they hope to stay in business and the good graces of their utilities commissions.

It is not
the
Individual
—
Or the
Industry
as a
Whole
—
But the
Everlasting
Teamwork
of Every
Bloomin'
Soul

Slogan of Associations' Executives

elephone manufacturer mean to the Independent

help the manufacturer today?

ecutive support the manufacturer by buying neces-
ed improvements?

and definitely answered in the statements on these INEER, realizing the importance of the Independ-ry and being fully aware of the fact that he is in enable him to carry on his valuable research and adequate source of supply, asked these questions of s and directors of the United State Independent as operating men, have frankly and conscientiously bject.

NG MEN, your manufacturer needs your support alf, TELEPHONE ENGINEER urges your im-ion in placing orders for needed equipment and

It is not the Individual — Or the Industry as a Whole — But the Everlasting Teamwork of Every Bloomin' Soul

Must Maintain Your Source of Supply

By
G. X. CANNON
Director
U. S. Independent Telephone Ass'n

THERE is no question but what the Independent telephone manufacturer's problems in these times of economic stress should be given the serious consideration of Independent telephone operators throughout the country.

The contributions and the assistance that they have made to the development of Independent telephony is beyond measure.

Each operating telephone company should, in appreciation, make special efforts to do all the work that his financial condition would enable him to do in these times, so as to maintain these necessary sources of supply.

Action Louder Than Any Words

COMMENTING on the part played by the Independent telephone manufacturers in the telephone industry, and the fact that they should receive the co-operation of operating companies, Louis Pitcher, director of the United States Independent Telephone Association says:

"What could I say that would be better than our action?

"Having just completed the rebuilding of our city plant by the installation of underground cables replacing aerial cables and wires, we are now giving our attention to replacing our old rusty iron rural circuits with copper."

Take Advantage of Low Prices

By
J. H. AGEE
Director
U. S. Independent Telephone Ass'n

I HAVE never seen in my experience a more favorable time for telephone companies to purchase supplies than the present one.

The Independent manufacturers have certainly done their part in adjusting prices and costs to the present economic condition and if telephone companies need to replace equipment or rebuild properties, this is the ideal time from a cost standpoint to undertake such work.

It goes without saying that the Independent manufacturers should receive the support of the Independent companies.

Endorses "Buy Now" Program

By
L. S. GARDNER
President
Texas Independent Telephone Ass'n
Director
U. S. Independent Telephone Ass'n

IT IS my opinion that all Independent telephone companies in Texas should patronize the Independent manufacturers and dealers and to do so as often as it is possible and necessary.

It is true there are some Independent telephone companies that need material at the present time that do not feel that they are financially able to purchase same. However, I believe there are a number of Independent exchanges in Texas owned by individuals and others that no doubt need materials for the purpose of keeping their plant in as good shape for the rendering of adequate service as to their present conditions will permit. These companies no doubt could buy more or less material now from the Independent telephone manufacturers.

I believe if they are able to make the purchases and need the material that they could render the Independent telephone manufacturing industry a great service at this time by so doing.

Therefore, I am heartily in favor of the slogan "Buy Now" as applicable to Independent telephone companies in Texas where their conditions warrant them doing so.

Don't Use Depression As Excuse

By
SAMUEL TUCKER
President
Kansas Telephone Association
Director
U. S. Independent Telephone Ass'n

MANY are using this depression as an excuse for not making efforts to replace the decay of their telephone exchanges, apparently forgetting that if they do not lay aside out of their earnings each year for the replacing of the decay, that they are losing just that much forever for future subscribers can not be expected to pay a rate to cover past loss.

Every telephone man who does not cover depreciation each year is worth five or six per cent less at the end of the year.

I know that money is scarce, but labor is cheaper and in most cases material is cheaper so WHY TAKE A PERMANENT LOSS each year, buy material and labor NOW and take advantage of the depression.

Buying Now Aid in Solving Problems

By
W. G. BROREIN
President
Florida Telephone Association
Director
U. S. Independent Telephone Ass'n

WE OPERATORS in the Independent field recognize our obligation to the Independent manufacturers in that they have always done much engineering and carried on much development and research which is of great value to us and without which our companies could not have progressed as we have.

We should, therefore, patronize these industries as much as we can now by examining our own situation and determining if we are spending what we can consistently, to put, or keep, our plant in the first class condition necessary to render our subscribers the high grade of service to which they are entitled.

Should all the Independent companies make what necessary improvements they can, many of our problems, as well as those of the manufacturer, may be solved.

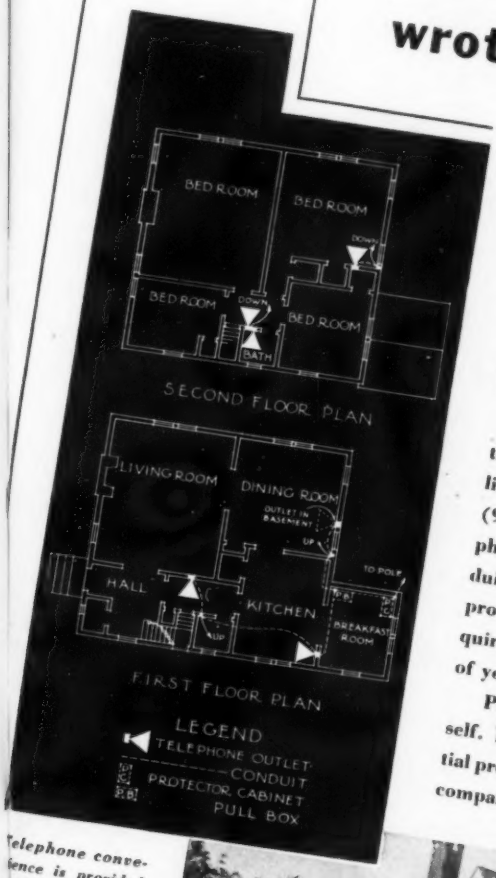
ADVERTISING

written by the industry to which it is addressed

CURRENT telephone advertising in building trade publications features sincere testimonials to telephone convenience by builders who have found it helpful in making houses more salable, more profitable, more livable. The advertisement on the opposite page includes *eleven* such quotations! Each was taken from a separate letter and combined in a logical sequence that covers almost every practical advantage of built-in telephone arrangements.

Written in the language of the industry to which it is addressed, this advertising should help put more conduit and more outlets into builders' blue-prints to the mutual benefit of *all* telephone companies.

11 practical builders wrote this advertisement

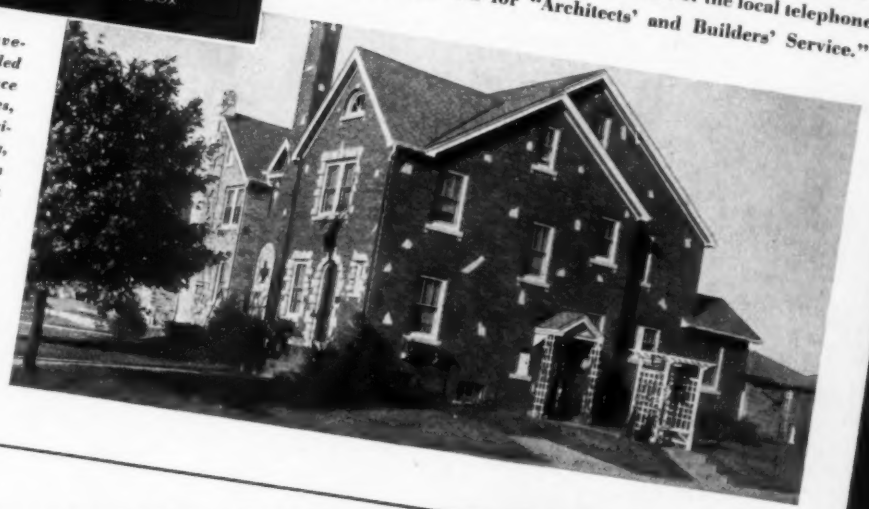


WE REGULARLY use these pages to tell you *our* ideas about built-in conduit and telephone convenience. But this month, for variety's sake, we let eleven practical builders present *their* ideas on the subject. Here are random extracts:

Telephone convenience: (1) "is expected by prospective purchasers and fully justified by its later use" (2) "is a necessity, not a luxury" (3) "provides an additional strong selling point" (4) "much more than repays the little it costs" (5) "receives the immediate appreciation of the buyer."

And again: (6) "provision should be made for telephones throughout the house" (7) "no feature adds more to the livability of the home" (8) "purchasers are very much pleased" (9) "we find it best to consult with representatives of the telephone company" (10) "we build in complete telephone conduit and outlet arrangements that will conceal all wires and provide ample pathways for present and future telephone requirements" (11) "we appreciate the splendid co-operation of your company."

Probably you've already proved these statements for yourself. If not, it will pay you to test them on your next residential project. Just call the Business Office of the local telephone company and ask for "Architects' and Builders' Service."



Telephone convenience is provided by in the residence of Dr. L. C. Ives, 900 North Sheridan Road, Peoria, Illinois, by built-in conduit serving six telephone outlets. GEO. B. KIRCHNER, Designer and Builder, Peoria.

ADVERTISEMENT OF THE
AMERICAN TELEPHONE
AND TELEGRAPH COMPANY

Two Strong Groups Needed

By
E. R. HANNIBAL
President
Washington Independent Telephone Ass'n
Director
U. S. Independent Telephone Ass'n

IT IS generally recognized by those who have studied the subject that the telephone industry did not really begin to advance until the expiration of the Bell patents, which made it possible for Independent manufacturers and Independent companies to function. The late E. K. Hall, in an official statement, laid down the principle that it is for the best interests of the telephone industry that there be two strong groups, meaning, of course, the Bell and Independent groups.

This being the case, it is very desirable that the Independent telephone companies co-operate and back the Independent manufacturers as far as is possible. This is especially true at the present time when manufacturers are hit so hard by business conditions.

With most telephone companies having large surplus stocks of telephones on hand, it would be well if the Independent companies would try to make their purchases of other items from the Independent suppliers.

Carries On In Spite of Depression

By
A. WARDMAN
President
California Independent Telephone Ass'n
Director
U. S. Independent Telephone Ass'n

THE writer is in thorough accord with the spirit of carrying on by the telephone industry through the depression. This company has not laid off a single employee on account of the depression and there were no cuts in salaries till the first of this year, which was ten per cent from the president down. We have followed this policy for we believed it to be in the interest of the nation as well as the industry itself and as a duty which we owed to our employees.

We have felt that where companies have been letting their maintenance go it was creating a false impression in reference to the actual earnings of the company, for the reason that the telephone users will not take into consideration the fact that deferred maintenance is bound to react in the future in increased operating expenses, and if fictitious higher earnings are shown it will naturally result in demands for rate decreases.

The companies in this position are liable to find a rate decrease and an increased burden in the future in accumulated maintenance expenses, which may place the industry in a very embarrassing position.

Unfortunately this spirit now prevails more or less in reference to public utilities in the State of California, as demonstrated by consideration of certain bills before the State Legislature. It is quite possible that out of this legislation public utilities will be greatly handicapped from a future earning standpoint.

In other words, in times of depression and unemployment you cannot afford to create more unemployment by failure to do work and especially maintenance work that would be required under ordinary circumstances, and maintain a proper rate structure, and I doubt if there is any explanation the average user would be willing to accept for this procedure.

The result is unfavorable legislation and in the future when these accumulated expenses have to be taken care of the public utility may find the rate structure such that it will be very hard indeed to finance accumulated maintenance work and meet its other obligations.

Stick By Manufacturer Appreciate Him

By
LELAND WRIGHT
President
Minnesota Telephone Ass'n

MANUFACTURERS and their trained staff of engineers and field representatives are, and can be of great value to the telephone operating company. These days of ever changing conditions, whether economic or scientific, call for close scrutinization by the telephone manager continually. Many of the operating men cannot afford the time or money to keep in close contact with the new improved methods of furnishing telephone service. Many of them are so busy with their own local problems that they cannot give attention to their neighbors of industry.

The manufacturer and his representative fill a great need in advising and helping his telephone-man-friend to solve his home business problems. Often matters arise which the representative can advise to a much better advantage for the operating man.

The least the operating companies can do is to realize that without the up-to-the-minute manufacturer, the telephone business would not be where it is today—and if we all do not "Think America" and "Buy America" it will be only a short time before the manufacturer will have to "close down" and then the entire telephone industry will go backwards. Telephone men — appreciate your manufacturer and stick to him.

Catch Up With Plant Maintenance

By
EDWARD F. McKAY
Manager
Oklahoma Utilities Association

WE UNDERSTAND the importance of the telephone manufacturer to the telephone industry, and are glad indeed if any word from us can even to the slightest degree cause telephone companies to see the necessity for catching up with plant maintenance and putting their properties in a condition of the usual high efficiency.

A friend of mine in the lumber business told me a few days ago that if each yard in Oklahoma and Texas, which is practically bare of lumber stock, were to order one car the mills could not supply the demand, and business would revive immediately in all branches of the industry, and he forthwith placed orders for seven cars of lumber. A Mid-Continent Oil company last week had occasion to construct a three-mile extension in its company telephone system and did not have enough wire in its warehouses in Oklahoma, Kansas and Texas to do the job.

It stands to reason that telephone properties throughout the country are in real need of both major and minor replacements. The new deal nationally is on and there is no reason why business in all lines should not immediately take a long step toward normalcy.

Telephone companies can do themselves the greatest possible service by buying immediately those things which the manufacturers are ready to supply and of which the companies are in need. Warehouse stocks are depleted and need replenishing. A general move to replenish them will be the most valuable co-operation that telephone companies can make at this time to the general welfare.

Manufacturer, Operator Need Each Other

By
H. M. SCHUMACHER
President
South Dakota Telephone Ass'n

AS WE go back in history we find that our forefathers were "every man for himself." He raised all his own needs and was independent. As time went on his needs became more and he had to change his methods, and work for his neighbors, thus becoming dependent upon them. They, in turn,

took his goods, or services. This process expanded until now we might say that one is dependent on the whole world for his needs. When we don't get these things from the whole world we are at a standstill. Now is the time to get people to see that we need each other's help.

Just so is the telephone manufacturer up against it. If one company can afford to extend its wants now, then the manufacturers can extend his, and others in turn will be benefited.

Now is certainly the time to buy. If a telephone company has any money to invest, it couldn't be put to any better use than to buy right now whatever supplies might be needed for the next year.

Manufacturers Need Encouragement

By
H. E. BRADLEY
President
Pennsylvania State Telephone and Traffic Ass'n

IT WOULD seem unnecessary to comment upon the importance of the Independent manufacturer in the Independent field.

The Independent company that withdraws its support from the Independent manufacturer, deserves no more consideration than the ungrateful child who, having grown to maturity and becomes self-supporting, turns upon and consigns to the poor-house, the parents who made possible its coming into the world and nursed it through the troubles and trials of its infancy.

Let any Independent operator consider seriously for just a moment, where he would go for equipment if the Independent manufacturer was compelled to close down. Do you think any other purchasing field would be open to him?

If the Independent companies have any money to spare for unemployment relief, let them spend it within their own family by buying from the Independent manufacturer, who is not only worthy but is fully entitled to their help and encouragement during these trying times.

Come to the Aid of Your Manufacturer

By
DR. J. G. SCHWARTZ
President
The Illinois Telephone Association

THERE never was a better time and opportunity to attain our equilibrium in our expenditures as relates to the necessary maintenance and changes of our property.

It is decidedly poor economy to sacrifice good service for a mystified saving. Now is the time to be on our toes, a time when the public is more exacting in their demands, and we should not be found wanting.

This cannot be accomplished unless our entire plant is in good physical condition. Therefore, to safeguard our own interests, it will be necessary that we purchase the needed material even in these stress times, which will act as a boom to our manufacturers, and a boomerang to us.

It will be well for us to visualize the future, and since there is a strong interdependence between manufacturers and operating companies, it would be folly to allow pessimism to dominate our actions; thereby, working a hardship on both. Where finances are in condition to warrant it, let this be our slogan, "Now is the time for all good companies to come to the aid of their manufacturers."

Keep Service Up To High Standard

By
HENRY A. BARNHART
President
Indiana Telephone Ass'n
Director
U. S. Independent Telephone Ass'n

THE manufacturing and supply business is a very necessary part of the Independent telephone industry, and, particularly at this time it needs and deserves the support and co-operation of operating companies.

As in the past, operating companies will need the manufacturers' valuable development and research work, advice and source of supply in the future.

It is the duty of every telephone company financially able to make needed improvements to do so as soon as possible. Not only will it help our manufacturers, but it will keep telephone service up to a desirable standard and improve company relations with its patrons.

TELEPHONE SEEN AS AID TO ARMY

Rochester officers of the Organized Reserves of the United States Army recently were shown with what ease, dispatch and efficiency the Army could take over the nation's telephone communication system in time of national emergency. They talked with Los Angeles and Pasadena.

The demonstration came as a part of the regular troop school of the 391st Infantry Reserves. The entire engineering staff of the Rochester Telephone corporation attended the meeting and made the program possible.

The feature consisted of showing how a call is put through from Rochester to a distant point. Using the whole wire circuit turned over to them by the telephone company and by means of loud speakers, the Reserve officers followed the call through Dayton, Ohio, Chicago, Denver, Los Angeles and to Pasadena.

It was explained how the Army could take over and connect commercial lines with its field lines to the front and coordinate the telephone, radio, buzzer phone, mounted and motorcycle couriers and runners.

ASSOCIATION ELECTS OFFICERS

At the First Annual Convention of the Western Red Cedar Association-Northern White Cedar Association, Consolidated, which concluded at Minneapolis March 24, the following officers were elected.

President, W. T. Kuntze, National Pole & Treating co., Spokane, Wash.; vice-pres., Dawson Brande, B. G. Carney & co., Minneapolis, Minn.; treasurer, George B. Partridge, T. M. Partridge Lumber co., Minneapolis, Minn.; Directors: R. V. Clute, Weyerhaeuser Sales co., St. Paul, Minn.; Beecher Hitchcock, Schaefer-Hitchcock co., Sandpoint, Idaho; J. E. Gerich, MacGillis & Gibbs co., Milwaukee, Wis.; G. H. Ramsey, National Pole & Treating co., Minneapolis, Minn.

OPENS NEW EXCHANGE

The Illinois Bell Telephone company formally opened its new north shore central offices and Winnetka (Ill.) exchange March 18. President William B. Moulton of Winnetka made the first call through the new equipment. The new north shore central offices and Winnetka exchange are housed in a structure of dignified Georgian architecture located at Oak and Linden streets flanking the Winnetka Village hall. The site was formerly occupied by Christ Episcopal church and prior to that by one of the north shore's first trading posts.

FIRE DOESN'T SCARE THIS OPERATOR

While flames crackled nearby and fire raged in the adjoining room, Miss Mary Spry, chief operator at Hinckley, Minn., stuck to her switchboard and summoned the local firemen one by one. She also called for outside aid, besides arousing occupants of the flaming structure. The telephone exchange was wiped out and four other business places destroyed when the flames wrecked a large two-story brick building in the center of the town. Miss Spry remained on duty until the flames threatened to cut off her escape, but by that time she had thoroughly aroused the town.

TESTING CABLES UNDER GAS PRESSURE

(*Continued from page* 14)

fitted with a permanent plug instead of a valve, after the gassing operation is completed. Figure 5 is a similar sectional view through a splice sleeve having a sleeve plug holding clamp attached thereto, by means of which the gassing hole is plugged without the necessity of waiting for a reduction of the gas pressure within the cable. Figure 4 is a fragmentary sectional view showing the sleeve plug in the wall of the sleeve. Figures 1 and 2 show the alignment tool and paper punch, used to cut true circles in the paper paster and mark the cable so the operator can align the paper paster equally around the plug.

In Figure 3 there is shown a splice sleeve 40 having a telephone cable 10 entering same in the usual manner. The wall of the sleeve 40 has drilled therein a hole 41 for the entrance of nitrogen gas. The fitting to be used for gassing the sleeve includes a central stem 42, having an enlarged portion 43 upon which there is formed a toothed nipple 44 for the reception of the connecting hose from any suitable supply of nitrogen gas to be used. The nipple 44 is provided with a central internal passage 45 connection with a downwardly extending pasage 46 within the enlarged portion 43 of the stem 42. A hemispherical piece 47 of rubber, or other resilient material, is held against the under-surface of the stem 42 by means of a cap 48 threadedly engaged with the enlarged portion 43. The hemispherical piece 47 has a central opening 49 communicating with the passage 46 and the hole 41 in the sleeve. The stem 42 is surrounded by an externally threaded bushing 50 having an enlarged upper end 51, the outside surface of which is knurled. The stem 42 projects above the bushing 50 and is fitted with a washer 52 and cotter key 53 for maintaining the bushing upon the stem.

The threads of the bushing 50 engage a tapped hole in an elongated brass plate 54. The plate 54 has fastened to one end thereof a length of chain 55, which passes around the sleeve 40 and engages a slotted opening 56 in the opposite end of the plate 54. In the application of the special gassing clamp, the hemispherical piece 47 is placed over the hole 41, the chain 55 is wrapped around the sheath and inserted in the slotted opening 56, and the bushing 50 is then rotated by means of the knurled upper portion 51 to press the hemispherical rubber piece 47 against the surface of the sleeve 50, thereby making a gas-tight connection. Nitrogen gas is then introduced through the passages 45, 46, and 49 until the desired pressure for testing the sleeve and cable is obtained. It is to be noted that the pressure exerted upon the rubber piece 47 is a direct downward pressure best adapted for making a gas-tight seal. After the cable has been gassed and tested, the special gassing clamp, shown in Figure 3, is removed for the purpose of sealing the gassing hole 41.

Three-Hour Loss

The types of plugs heretofore in use cannot be successfully soldered in place under pressure, and, for that reason, it has been necessary to wait until the gas escaped from the cable before the hole could be plugged and soldered. This requires ordinarily that at least two workmen must wait an hour and a half, or more, and results in a large waste of valuable time. Although, many of these plugs can be driven or otherwise fastened in the hole to make a temporarily gas-tight seal, still when a hot soldering iron is applied to solder the plug in place, the unequal expansion of the metal of the splice sleeve and the metal of the plug destroys the tightness of the seal and permits the nitrogen gas, which is under pressure, to bubble through the solder.

This has made it practically impossible to secure a permanent gas-tight seal while any appreciable gas pressure remains in the cable. By the use of the sleeve plug holding clamp, shown in Figure 5, however, the hole may be immediately plugged and soldered without waiting for the gas to escape. With this sleeve plug holding clamp a brass plug 57 is inserted in the hole 41. The said plug 57 has a lower portion of a diameter to be easily inserted in the hole and has an upper portion 58 of a larger diameter.

The upper portion 58 is tinned so that solder will adhere thereto and is undercut, as best shown in Figure 4, to produce a sharp cutting edge 59 around the lower circumference thereof. The upper portion 58 is also provided with a recess 60 for the reception of the reduced lower end of a stem 61, Figure 5. The stem is externally threaded in its upper portion and engages a tapped hole in a plate 62, similar to plate 54. The plate 62 is provided with a chain 63 fastened to one end thereof, passed around the sleeve 40 and inserted through the slotted opening 64 in the opposite end of the said plate 62. The stem 61 is provided with a handle 65.

Tightness of Seal

In the use of the plugging apparatus the stem 61 is engaged with the recess 60 in the plug 57, the chain 63 is wrapped around the sleeve 40 and inserted in the slotted opening 64, and the stem 61 rotated by means of the handle 65 to press the plug 57 downwardly. In the downward movement of the plug 57 the cutting edge 59 of the plug is pressed into the metal of the sleeve 40 sufficiently to form a gas-tight seal so long as the pressure of the stem 61 is maintained. With the stem 61 still in place, a quantity of solder 66 is flowed around the upper portion 58 of the plug 57 and serves to hold the plug in position. In this form of plug, the unequal expansion of the plug, caused by the hot soldering iron, instead of destroying the gas-tight seal, causes the metal of the splice sleeve to be swedged into the undercut behind the cutting edge 59. This preserves, instead of destroying, the tightness of the seal, and the solder is therefore free from the blow holes, which would be caused by escaping gas with the forms of plugs heretofore in use. To prevent the solder from adhering to the stem 61, the lower end of the said stem is preferably made of aluminum or is fitted with an aluminum bushing 61A. When the solder 66 has solidified the stem 61 is backed off and the apparatus is removed, leaving the plug 57 firmly in place.

The use of gas in testing cables has brought to light some conditions relative to wiped cable joints that have been long suspected, but not proved up to now. Application of gas has shown up so many joints that are not air tight, that engineers decided there must be a reason other than defective workmanship. As the result of experiments made under careful tests it has been found that joints will not meet the gas test when the wiping solder is too hot or too cold when wiping the joint. The old method of testing the temperature of the solder with a piece of paper results in using incorrectly heated solder with the result that the joint becomes porous. An instrument for checking the temperature of the solder should be used so there will be no question about the temperature being correct at the time the joint is wiped.

These same scientific tests show that wiping solder should be stirred when and only when it is at the correct wiping temperature. Often times it is stirred with a ladle when it is not at the correct wiping temperature, which results in the separation of the tin and lead, with the result that the joint, while looking to be perfect, is porous and will not meet the gas test. The solder should be stirred when a temperature testing instrument reading

(*Continued on page* 30)

BELL SYSTEM EXHIBIT AT WORLD'S FAIR

(*Continued from page* 10)

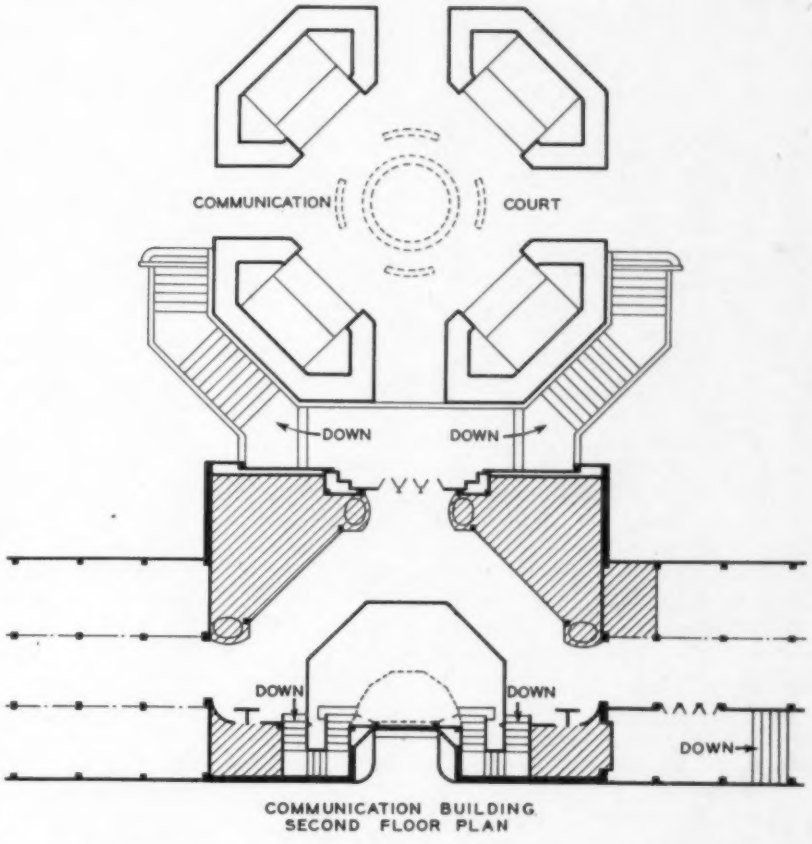
Union and the southwest by the International. The spaces on the first floor of the main building immediately adjoining the western pavilions are occupied by the last named companies. Across the hall on the west side of the building and on either side of the doorway are spaces assigned to the Bell System. An aisle with exhibit booths on each side connects the Communication Building to the other sections of the electrical group.

On the second floor, the aisle from the other sections swings around a balcony rail, leaving a well or large open space from the ground floor to the roof. In addition to the entrance reached by stairways around the pavilions, there is another second floor entrance. This is provided by an exterior flight of stairs which ends in a wide doorway into the corridor at a point just south of the Communication Building.

The two large triangular areas and the two smaller rectangular ones on the second floor are Bell System spaces. In addition, a semi-circular mezzanine balcony is being erected over the west doorway and projecting into the well. The demonstration which will take place in this area, which is also a Bell System area, will be observed from the edge of the balcony, along which there are being provided a few seats and a protecting rail.

The Bell System exhibit occupies, as is evident from the accompanying sketches, nine separate areas. Although these are apparently widely scattered, it will be recognized that they are also strategically placed so that one or more of them adjoin every entrance to the Communication Building. Furthermore, the entire second floor is devoted solely to Bell System exhibits, and through appropriate decorative treatment and a patterned floor covering it will have a distinct unity of its own.

Plans for the occupancy of the other space in the Electrical Building have undergone alteration since their original projection. The south end of the building — a semicircle around an electrical court—will be occupied, as was originally planned, by the light and power industry and its manufacturing companies. Recent alteration of plans has affected, however, the north end of the building which was originally proposed for radio and, it was hoped, for television. For various reasons these plans have been changed and the north end will be devoted to social science, with the intervening exhibit areas allotted to radio companies.



Second Floor Plan, Showing Outline of Concrete Towers, Which Rise a Hundred Feet above the Pavilions, and Stairways to a Balcony Entrance to the Communication Building.

Arrangements for the Bell System exhibit, which have been carried on under the general direction of Vice-Presidents A. W. Page and F. B. Jewett, of the American Telephone and Telegraph company, have been rather definitely in consonance with the fundamental plan of the Exposition to show the industrial applications of pure science in two-way communication. In planning the exhibit, a definite philosophy was first required. Attacking that problem by asking what message the Bell System should convey to the public through its exhibit, it was felt that the exhibit as a whole should emphasize: (*a*) the institutional character and policy of the Bell System; (*b*) the nature and extent of the plant and equipment which lies behind the terminal apparatus with which subscribers are familiar and the operations involved in rendering the services which the System offers; and (*c*) a fuller knowledge of these services and of the convenience and economy accompaying their use.

With this point of view, the two pavilions have been made institutional exhibits and headquarters for the exhibit. Incidentally, to a considerable extent the two other companies in the Communication Building are giving similiar treatment to their pavilions so that the "Communication Court" promises a quiet, dignified presentation of the institutional character of the organizations most concerned in two-way communication. The two areas on the first floor are commercial in character and devoted, one to the exemplification of the convenience of the telephone in home and office, and the other to the economies which Bell System services offer to the business man in inter-city communication, with particular reference to teletype-writer service, keytown selling, and the like.

In the areas devoted to the convenince and economy of Bell System services there will be representatives who can discuss with interested visitors any of these services. There will also be exhibits of substation equipment and of teletype-writers and some related demonstrations of a scientific character. For example, there will be provided in one exhibit area an oscillograph and associated with it a loud speaker. This oscillograph will show the wave form of words which come from the loud speaker. The apparatus will give an idea of the complexity and range of sounds which must be accurately transmitted and reproduced in order to give high quality telephone service. In the other exhibit area there is proposed a

small demonstration equipment to show the operation of a step-by-step system of switching. This demonstration will operate in response to dialing by a visitor.

Panel Switching

The second floor areas are devoted to illustrating the equipment and methods of operation which lie behind the scenes in Bell System services. One large triangular space will contain an exhibit of panel switching in which there will appear the various types of frames necessary in central offices. Demonstration calls can be made through this equipment. One demonstration call will be set up and carried out automatically once every minute with attention directed to the operations involved by flashing signs and by lights on the moving parts of the mechanism. Other parts of the mechanism will be in operation as if transmitting calls, so as to give some idea to the type, although not of the extent, of equipment and operations involved in dial central offices. Three dial telephones will also be provided nearby at the desk of an attendant from which any visitor may dial any one of three other telephones on the opposite side of the desk and while doing so trace through appropriately colored lights the operations of the mechanism and the progress of his particular call through the panel frames.

This dial telephone exhibit illustrates one of the principles adopted in planning all the other exhibits. First, for the visitor who would hurry by, it provides some impression of the magnitude and complexity of the operations involved in interconnecting telephone subscribers. For the man who is attracted and willing to spend a little more time it provides an opportunity to take part himself in the demonstration by dialing a call of his own selection and observing its progress. And third, it provides for those with further interest a chance to examine the equipment in detail and on a reading desk extending beneath the equipment to find sufficiently complete and technical explanations. In general an attempt has been made to provide in each instance an exhibit and material suited to all degrees of comprehension and interest from the casual to the expert.

The other triangular area will be devoted to a demonstration of the speed and quality of intercity telephone service, with demonstrations of telephone calls from Chicago to one or two important cities in each state of the Union.

The two rectangular areas on the same floor will be devoted to engineering demonstrations of proven and popular interest. One consists of inverted speech and privacy of radio telephone conversations, and the other of carrier-current communication and the multiple channel use of lines. The mezzanine balcony will contain demonstrations of scientific character the details of which are now being worked out.

Typical Operations

In addition to the exhibit areas just described, four small elliptical areas are obtained by partitioning off the exterior corners of the two triangular areas, as may be seen from the second floor plan. In each of these there will be demonstrated some typical operation which is involved in rendering communication service. To visualize one of these demonstrations one imagines a central office where a black cloth is spread so as to hide all the switchboard and all its operators, except just one position and the operator in front of it. That is what the visitor to the Exposition will see in each of these four niches. A mild spotlight concealed above will illuminte the position and its operator, and the back and sides of the niche will be finished in dull black. Through an arrangement of cams and relays a dummy or fictitious load will be produced so that the operator will carry on the usual type of operations. The load, although characteristic in types of operation, will be lighter than usual and she will be expected to answer questions on the part of visitors. So that she may pause to answer, a switch will be provided by which she can momentarily interrupt the signals of the dummy load. It is planned also that her voice shall be assisted by a lapel microphone and a small concealed loud speaker.

The four positions to be thus demonstrated as those of a manual operator in the central office of a small city; a dial service operator who, in a large dial exchange, performs various services for subscribers; a call announcer operator of a metropolitan area; and a teletypewriter exchange operator. In the case of the call announcer position it will be possible for the visitor himself to dial any four digit number which he desires and hear the words as does an operator at such a position. Incidentally, adjoining this operator's position in this case there will also be a call indicator equipment which will be available for the visitor to demonstrate for himself by dialing.

The teletypewriter exchange operator, in addition to carrying a fictitious load, will actually perform upon signal the switching operations required by either of two teletypewriters which are exhibited in the commercial space on the floor below. There will thus be possible a complete demonstration of both terminals of a teletypewriter system and of the "T.W.X. position."

Manual Operation

In a similiar way the operator at the manual position will give service to a number of telephones located for demonstration purposes in the first floor area which is devoted to the convenience of telephones in home and office.

Such in general is the character of the Bell System exhibit which the American Telephone and Telegraph company is planning at the Century of Progress on behalf of its associated companies.

The erection of the building was completed some time ago and the installation of switchboard equipment is now being carried out by the Western Electric company.

Such a wide variety of services, of equipment, of engineering techniques and operating practices is involved in the work of the Bell System that no limited exhibit can adequately portray its work. Selection, therefore, was necessary and only a small number of typical operations was possible. Those chosen, in general, are those which have proven to be of greatest interest to visitors to the telephone plant and to the laboratories. It is probable, therefore, that they will attract favorable attention and will interest the large section of the public which has been unable to visit central offices.

Telephone Convention

It goes without saying, of course, that many telephone men will attend the Exposition to view the elaborate Bell System exhibit, especially when it is considered that the Annual Convention of the United States Independent Telephone Association will be held July 11, 12, 13 and 14. Telephone men are fortunate in that they can attend their convention and the World's Fair at the same time.—*Bell Telephone Quarterly.*

SELL YOUR HOTEL

"It gives me a great pleasure in informing you that at this time through the use of the telephone it was possible for us to book our hotel for a two week period of a certain coming show.

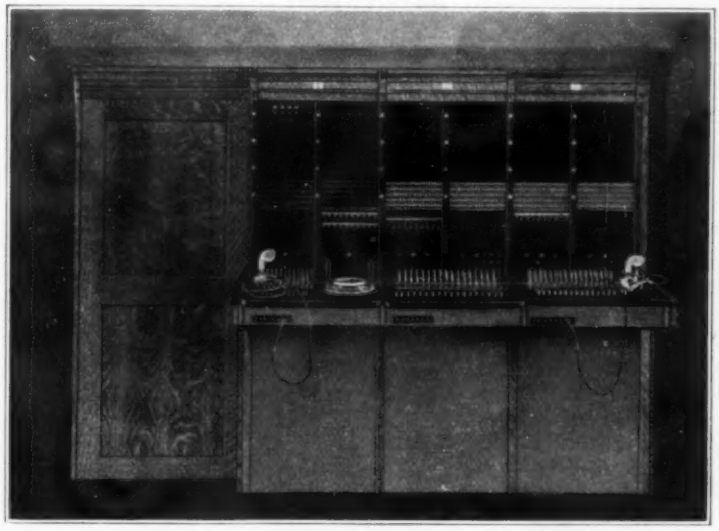
"We feel that the telephone and the service that is given us here is a very important asset to this hotel. It enables us to do things in a very rapid and saving manner."—*Harry I. Friedman, Manager, Ritz Hotel, Washington, D. C.* —**The Transmitter.**

During 1932 a total of 122,000 inquiries was received by telephone by the Chicago Tribune.

NEW EQUIPMENT INSTALLED AT BLOOMFIELD, IA.

By
F. B. KNEFEL
District Manager
Kellogg Switchboard & Supply Co.

THE CITIZENS Mutual Telephone company of Bloomfield, Ia., believes in doing its part in keeping step with modern improvements and giving its subscribers the finest type of service. Just recently the company cut into service a new, three-position Masterbuilt switchboard and other modern central office equipment in its exchange at Bloomfield.



Three-position Masterbuilt switchboard similar to the one installed in the Citizens Mutual Telephone Company, Bloomfield, Iowa.

Bloomfield, the county seat of Davis County, has long been noted for its spirit of progressiveness and constant efforts to build a town that is truly modern in every way. The rich farm land is so fertile that almost any crop can be raised profitably and successfully. Considerable stock, too, is raised and fattened with the forage that grows so plentifully in this area.

Constant Growth

Bloomfield has shown constant growth and progress ever since the territory about it was first explored by the two indomitable Frenchmen, Marquette and Joliet. In 1846 a subscription school was already established with an attendance of twelve pupils. The first school building erected in Bloomfield was built in 1849. It was completed at a cost of $3,000, an enormous sum for such an expenditure in the forty-nines. Bloomfield's recently completed high school cost $149,000. Among other things, Bloomfield also has a modern municipal light plant and water system, an extensive library, four good-sized churches and two banks. The Wabash and the C. B. and Q. Railroads, two bus lines, and two highways afford excellent transportation and shipping facilities.

In keeping with Bloomfield's progressive attitude and desire to give her residents the best of everything possible, the telephone company also was conceived with the idea of instituting a telephone service that would be second to none. Consequently, plans were made and actual work on a new telephone system was begun a short time after the original suggestion was made.

The first step in the program of improvement was the construction of the company's own telephone building — a two story brick structure with every modern convenience, including an automatic heating system. The building houses both the company's own local exchange and the Bell company's long distance exchange. The Citizens Mutual occupies the entire first floor and basement, and the toll line company occupies the second floor. Connections between local and long distance switchboards are handled over trunk switching circuits.

Writes Letter

The next step in the program was the purchase of a switchboard to be installed in the new building. The company chose a Kellogg Masterbuilt board for the reasons given in the following paragraphs taken from a letter written to the Kellogg Company by Mr. A. L. Rupe, Wire Chief of the Citizens Mutual Telephone company:

"The officers of our company made a thorough investigation of all central office equipment manufactured before reaching a decision on the type to be purchased for Bloomfield. We have in our exchange 1100 subscribers, of which number about 450 are rural stations. We connect with the Bell company for long distance. With the large number of rural subscribers to be connected with city subscribers, and our desire to convert all of the city lines to common battery as rapidly as our subscribers can be converted, it was necessary that we purchase a switchboard which was flexible enough to meet these conditions. We found that the Kellogg Masterbuilt Universal switchboard possessed all of these features. We have a number of our city subscribers now working common battery.

"Using the Universal line and cord circuits, any operator can answer a call from either a toll, rural or local line. With these flexible features and the interchangeable positional equipment, we do not have any fear of outgrowing our switchboard. We feel that with our Masterbuilt switchboard and our new building we are in a position to furnish telephone service second to none."

1200 Local Lines

The Masterbuilt switchboard now operating at Bloomfield, is equipped with Universal line and cord circuits, and has a capacity of 1200 local lines and 80 rural lines. All of the lines are arranged on a three panel multiple, with a complete multiple of lamps. Any operator can answer and complete any call. This arrangement of Universal line circuits, and complete multiples of-

fer the greater flexibility in operation. The company has an unusually large number of rural stations, and their demands for interconnection with local stations presents a traffic problem that can be efficiently and economically handled only by such an arrangement of circuits and equipment. All of the lines and cord circuits have an associated master pilot lamp. The lines have a pilot for every panel, and the cords a pilot for each position.

The cord circuits are of the full Universal type, with two party selective ringing. Selection of the ring is made by individual ringing keys associated with each cord circuit. The ringing keys are of the indicating type, and show which party operator has been ringing. Each cord circuit is provided with a relay busy test which gives the operator a positive busy signal when testing a busy line.

Each operator's position is equipped with electric peg count meters, which provide a convenient and speedy method for making a study of any particular class of service. The switchboard frame is steel, of unit type construction with a dark oak trim.

Steady Traffic

The public of Bloomfield is very much telephone minded as is shown by a steady traffic throughout the day. This traffic has materially increased since the new equipment has been installed. The increase is certainly pleasing to the officers of the company, as it readily proves that their subscribers are appreciative of better service and use it more extensively than they used the old type of service.

Too much credit cannot be given to the following officers of the company for the important part they had in bringing such excellent telephone service to Bloomfield: president, W. O. McMillin; secretary, O. F. Sloan; treasurer, W. H. Wiseman; wire chief, A. L. Rupe.

The officers of the Citizens Mutual Telephone company extend an invitation to their telephone neighbors to visit them in their new home and see more intimately the operation of the Masterbuilt switchboard.

TESTING CABLES UNDER GAS PRESSURE

(*Continued from page* 26)

shows it to be heated to the correct temperature for wiping.

"Rotten Solder"

Wiping solder that is not of the correct mixture of tin and lead, regardless of whether it is new or old, or to what temperature it is heated when the joint is being wiped, will produce a defective joint regardless of the skill of the cableman who wipes the joint. Gas tests have proved that "rotten solder" should be replaced, and the cableman not expected to perform good workmanship with a material that should be junked.

We are indebted to the engineering staff of the Indiana Oxygen Company of Indianapolis, Indiana, for data used in this article. They have developed cable valves, plugs and tools for maintenance and testing cables under pressure with nitrogen gas, of which they are large manufacturers.

LINE AND DESK

(*Continued from page* 19)

function as a part of the main frame protectors for the protection of central office equipment on an aerial cable plant. When a cable extends a distance from the office underground and then takes aerial, this short section of 24 ga. cable is generally inserted at the junction of the aerial and underground. Some make the mistake of inserting a section of the smaller cable on both sides of an underground dip in aerial cable which is not ordinarily considered necessary.

Q.—What sized cable rings should be used on various sizes of cable?

A.—The type of cable should be considered but the following information is offered which it is believed, meets the average condition on 22 ga. lead covered cable. Up to 150 pairs 1¼" rings; 150 to 400 pairs, 2½" rings; 400 to 600 pairs 3" rings, and 600 to 900 pairs, 3½" rings. Rings should always be ordered to fit the size of suspension strand used.

NOTED PHONE ENGINEER PASSES AWAY

Frederick Leland Rhodes, international authority on telephony, electrical engineer, author, composer and civic worker died at Short Hills, N. J., March 18.

For 40 years until his retirement last year he was in the service of the American Telephone and Telegraph company and its predecessor, the American Bell Telephone company.

Born in Boston, Oct. 2, 1870, Mr. Rhodes attended the Massachusetts Institute of Technology. He was one of the engineers whose work in 1915 resulted in the completion of the transcontinental telephone line which made possible the first speech transmission between the Atlantic and Pacific coasts and led to the extension of nation-wide telephone service.

Convention Schedule

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 10 and 11.

Pennsylvania State Telephone & Traffic Association, Penn-Harris Hotel, Harrisburg, May 23, 24 and 25.

United States Independent Telephone Association, Tower Room, Hotel Stevens, Chicago, Ill., July 11, 12, 13 and 14.

CONSOLIDATION IS REPORT FEATURE

The consolidation last February of the former Northern New York Telephone corporation with the New York Telephone company is one of six consolidations featured in the annual report of the latter organization sent to stockholders recently.

Telephones to the number of 53,218 were added to those of the New York company by the consolidations, the notice says. Despite this, however, a decrease of 7 per cent, or 191,074 phones from 1931, was seen. The company's total of 2,407,604 phones was approximate in number to those in service December 31, 1927.

TEN MINUTES

to melt 50 pounds of solder! Couple this feature to the strength and simple design of all UNIQUES — and you have the reason it's preferred in the telephone field. We'll send it on trial. Write—

UNIQUE
Manufacturing Co.
225 Whiting St.
Chicago, Illinois

Facts

PROVE THEIR MONEY SAVING

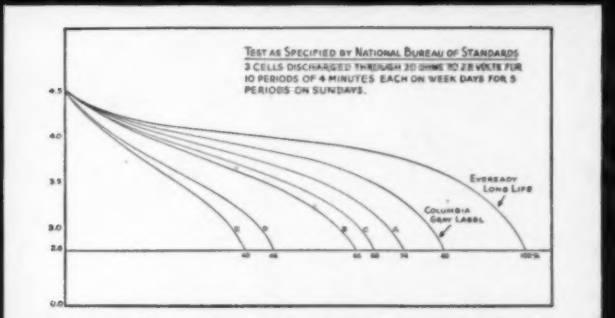
RIGHT now — at a time when telephone-service economies are being sought to help make up decreases in revenue — the superiorities of Eveready Long Life and Columbia Gray Label cells stand out in sharper relief than ever.

The Graph **at the right shows unmistakably that there's far longer life in these two acknowledged leaders in telephone cells, than in any others in general distribution. Longer battery life means lower operating cost-per-day; less frequent replacement-labor expense; longer sustained high transmission efficiency; fewer service interruptions and customer complaints.**

All-Armored Construction. **Thick, even-grained, rolled-and-soldered sheet-zinc can; and metal-seal top (a patented feature) . . . these mean cells perfectly insulated against energy loss; thoroughly protected against moisture and electrolyte leakage; strengthened against breakage in shipment or rough use (no wax or pitch seal to chip, crack or break).**

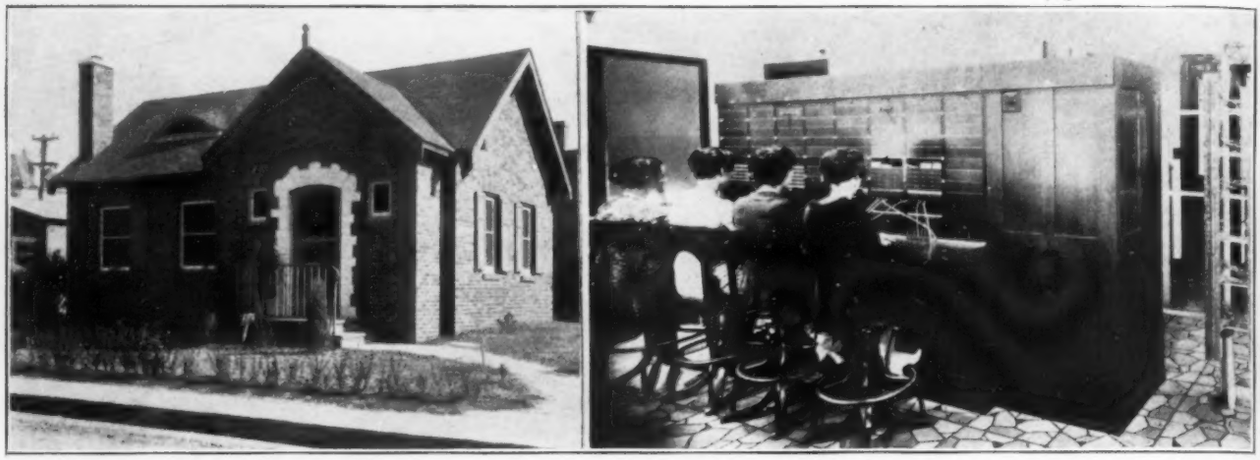
Low Prices **enable Eveready Long Life and Columbia Gray Label dry batteries to prove their matchless economy right from the start. Both buying and engineering wisdom suggest them as the only brands to use.**

NATIONAL CARBON COMPANY, INC.
General Offices: **New York, N. Y.**
Branches: **Chicago New York San Francisco**
Unit of Union Carbide UCC *and Carbon Corporation*


TEST AS SPECIFIED BY NATIONAL BUREAU OF STANDARDS
3 CELLS DISCHARGED THROUGH 20 OHMS TO 2.8 VOLTS FOR 10 PERIODS OF 4 MINUTES EACH ON WEEK DAYS FOR 5 PERIODS ON SUNDAYS.
EVEREADY LONG LIFE
COLUMBIA GRAY LABEL

Day's life on Standard Intermittent Test is expressed in percentages based on Eveready Long Life as 100%. The Columbia Gray Label shows 82% service, but also carries a lower price.

Columbia
AND
EVEREADY
Dry Batteries



Left: New telephone exchange building of the Scotia Telephone Company at Union, Missouri. Right: Stromberg-Carlson switchboard in operation at Union..

IMPROVED TELEPHONE SERVICE FOR UNION, MO.

By
P. WINEMILLER
Sales Engineer
Stromberg-Carlson Tel. Mfg. Co.

THE PLACING of new Stromberg-Carlson central office equipment in the Washington, Missouri, plant of the Scotia Telephone company in May of 1931 so noticeably improved the service rendered not only to the Washington patrons but also to the patrons in the neighboring city of Union, Missouri (there being considerable inter-city traffic between the two communities) that many of the subscribers of both exchanges made it a point to personally compliment P. Kerr Higgins, president of the Scotia Telephone company, as well as the employees of his organization. The Union, Missouri, subscribers, in the course of a few months, conferred with Mr. Higgins and requested that the Scotia Telephone company improve the Union exchange facilities and asked that the service be placed on a par with that being given at Washington.

All of the new Stromberg-Carlson equipment installed at Washington was functioning so perfectly that Mr. Higgins entered into a contract with the Stromberg-Carlson company for complete new central office equipment as well as telephones and immediately started the program of entirely rebuilding the Union exchange. New cables were placed throughout the city. All open wire leads were discontinued with the exception of the rural lines and a large percentage of these lines were reconditioned. All lines, including the Southwestern Bell Telephone company's toll circuits, (this exchange in a toll center) now enter the new exchange building underground.

Attractive Appearance

Considerable study was given to the type of exchange building which would be best suited for Union, with the result that the new quarters are not only well fitted for the requirements of an up-to-date telephone office but also that the new building presents a most attractive appearance. The building is constructed of rough-faced brick of a pleasing hue, resting on a foundation of reinforced concrete. The roof is of fireproof construction and the building in general has quite a few novel features including the colonial style window shutters painted green, wrought iron ballustrades, etc. The landscaping of the grounds is unusually beautiful, with the result that the new central office is now the show-place of the city. By referring to the floor plan shown, it will be seen that the building is of sufficient size so that the equipment could be located in a way that all units are accessible and, at the same time, space is provided for a 100 per cent growth of the initial installation.

The switchboard consists of four positions of Stromberg-Carlson steel frame unit type sections, each position being a unit in itself, and so arranged that it is only a matter of a few hours work to add new positions or change all cord circuit equipment to other positions. The relay gates, keyshelves and cord racks may be entirely removed from the sections and, with the exception of the cords and plugs, the equipment remains fully wired and assembled. The first two positions of the switchboard are each equipped with eight high efficiency semi-universal toll cord circuits. A Calculagraph is located between these positions. In order to facilitate the writing of toll tickets, these two toll positions are equipped with extra wide keyshelves.

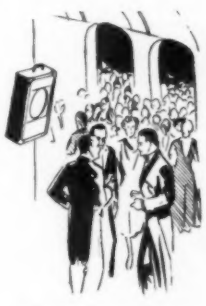
Postions three and four are each wired for 17 Universal cord circuits, position three being fully equipped and position four having 10 circuits installed. The Universal cords employ the time-tested and proven features standard on Stromberg-Carlson installations including the following:

Keyless answering on all incoming common battery calls; two party machine ringing on all local connections; reverting tone on both manual and machine ringing; instantaneous generator cut-off in both silent and ringing periods — eliminating transmitter replacements invariably due to high voltage ringing current passing through called subscriber's transmitters; flashing recall which eliminates false recalls due to the subscriber unconsciously touching his switch-hook while talking. This type of recall gives a distinct signal that cannot be confused with an originating call and also places the signal where it should be, namely in front of the operator who has previ-

NOW THEY CAN HEAR EVERY WORD DISTINCTLY

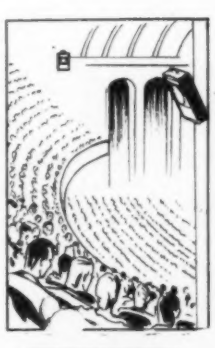
The New Webster-Chicago Public Address System Makes This Possible.

In every section there is a growing demand for these Portable Public Address Systems . . . every Telephone Company can rent or sell them. Take advantage of this opportunity not only to increase your profits but to build further GOOD WILL among some of your most important subscribers. When used for outdoor meetings, Churches, Schools, Auditoriums, as well as smaller groups, all listeners, even those on the outer fringe of the gathering, can hear every word distinctly.



A Quality Product At A Low Price

The complete Webster-Chicago Portable equipment is priced economically . . . in tune with the times and at a much lower cost than any other of equal size and performance. The amplifier is handsomely finished in black crackle; cases are in two-tone shark grain leather; the hardware is of solid brass; weighs only 85 pounds . . . packed in two cases 8¾"x14½"x22¼" each. Write for new 1933 catalogue illustrating our complete line that meets every sound amplification need. Get full details . . . it will pay you.



Type H.P. 59 Class "B" Portable Public Address System for microphone and phonograph.

The Webster Company

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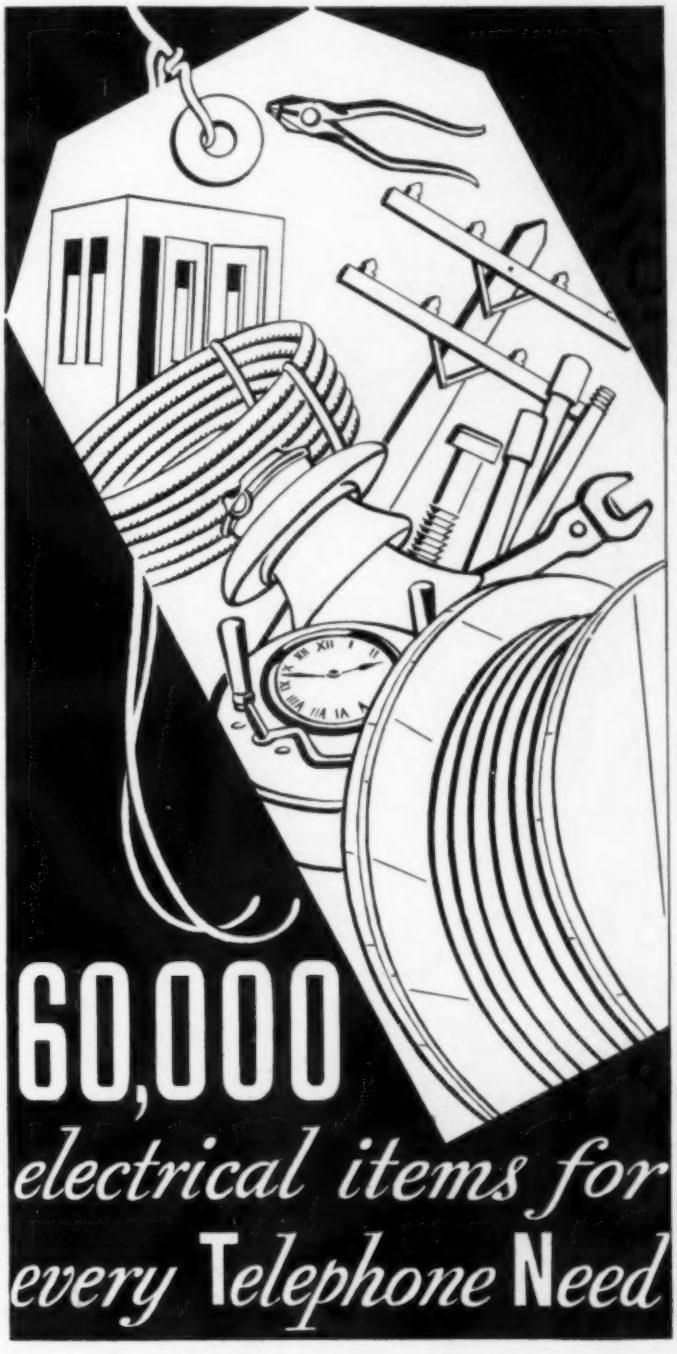


60,000 *electrical items for every Telephone Need*

In these days when everyone is looking for purchasing economies, Graybar's service of supplies makes economies possible . . . It brings 60,000 electrical items within arm's reach of the telephone user. Does away with "shopping" around. Eliminates expensive stocks . . . The natural result of Graybar's long experience in meeting the special needs of the telephone industry—an experience that goes back to the beginnings of that industry in America.

GraybaR

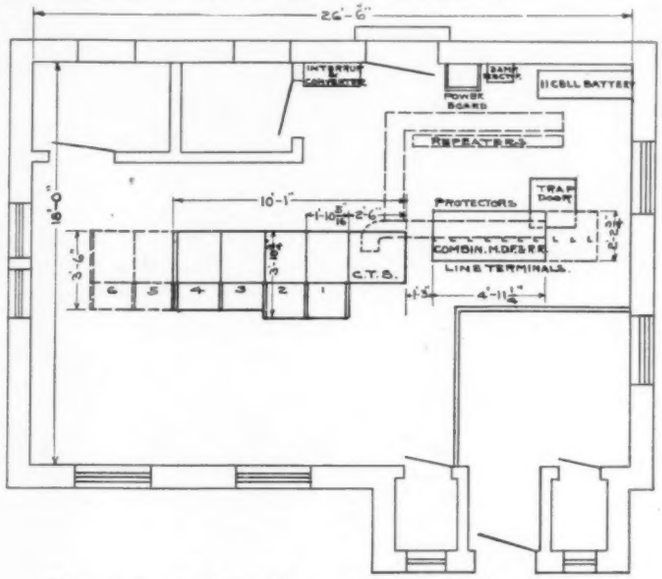
OFFICES IN 75 PRINCIPAL CITIES. EXECUTIVE OFFICES: GRAYBAR BLDG., N.Y.

ously handled the call. Individual two party ringing keys for the application of the ringing current on the proper side of the line; cam keys for manual listening and ringing on rural connections, the circuits being so arranged that the cam key is inoperative when operated in connection with local to local and rural to local calls.

The local line capacity of the switchboard is 1600 lines and the initial installation consists of 300 lines, these lines being arranged on a four panel associated multiple basis. The rural and toll lines are drop ended using cut-off relays, thereby eliminating all answering and multiple jackspring contacts. The rural lines are multipled throughout the board, making it unnecessary for any trunks to be used in completing connections between local and rural subscribers.

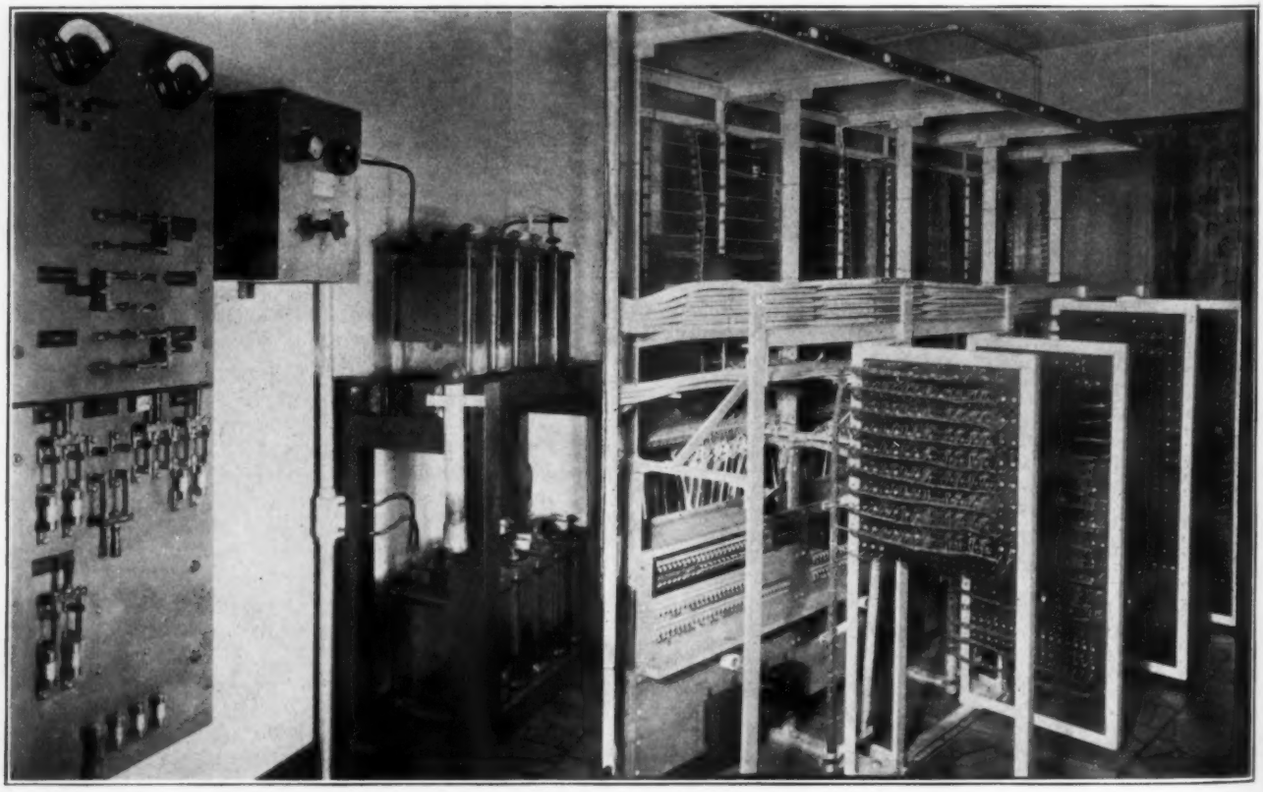
Golden Oak Finish

The tops, bottoms, and ends of all keyshelves are formica covered while the plug shelves and piling boards are covered with specially treated fibre. This finish of piling boards, key and plug shelves was adopted as a standard by the Stromberg-Carlson company in 1915 and has certainly proven its worth. Exposed woodwork on the switchboard is dull golden oak with the exception of the kick panels which are of steel, covered on both sides with battleship linoleum. By referring to the photographs, readers of this article will note that the combination main distributing frame and relay rack is an exact duplication of the equipment installed in the Washington exchange. Use of the popular and efficient 190-type Stromberg-Carlson line and cut-off relays make it possible to combine main distributing frame and relay rack equipment by the placing of the relays above the main frame proper, thereby saving valuable floor space. Experience has proved that it is seldom necessary to remove relay casings from these relays for the purpose of adjustment or cleaning, therefore placing them in what might be called an inaccessible position works perfectly.



Floor plan of new telephone exchange at Union, Missouri.

Ringing current is derived from duplicate Stromberg-Carlson No. 1-B Converters, each converter being a unit complete in itself with the transformers, vibrators and apparatus for the elimination of radio interference housed in



Left: Power equipment in the new Union, Missouri, telephone exchange. Right: Back view of the Stromberg-Carlson switchboard with gates open.

quarter-sawed oak cabinets with hinged glass topped covers. Ringing current from these machines is interrupted for machine ringing by the use of duplicate Holtzer-Cabot interrupters, the circuits being so arranged that in case of an AC power failure the 24-volt interrupter is immediately placed into service and upon resumption of the AC current, the 110-volt interrupter is again started.

Underwriters' O. K.

The power board is of the well known Stromberg-Carlson standard, constructed of Monson Maine slate, equipped with Weston No. 269 voltmeter and ammeters and Cutler-Hammer knife switches. All power wiring to and from the power equipment is enclosed in rigid conduit, thereby meeting all underwriters' specifications.

The main battery consists of 11 cells of Electric Storage Battery company's E. O. G. O. 5 in sealed and spray-proof jars. This battery has sufficient capacity to carry the present exchange load for a period of 48 hours. Charging of this battery is accomplished by the use of General Electric full wave noiseless 9X647 Tungar Rectifier having a maximum capacity of 12 amperes. Necessary equipment is included so that the batteries may be continuously trickle-charged, thereby holding it at a constant voltage which materially prolongs its life.

Wire Chief's equipment is complete in every detail and consists of a Stromberg-Carlson No. 2-B Wire Chief's Turret compete with the necessary shoes and plugs allowing for the testing of lines either from the multiple or answering jacks or from the protector or line side of the main frame. Incorporated with this wire chief's equipment is a special No. 269 Weston meter that may be adjusted so that readings taken with it are 100 per cent correct.

Protection for the local lines consist of Cook No. 1000 combined heat coil and carbon block arresters, Cook No. 105 combined heat coil carbon and fuse arresters for the toll lines and Cook H-36 fuse and carbon block arresters for the rural lines. Necessary pilots and alarms for indicating operated heat coils are supplied.

Mr. Higgins Has Confidence

No detail or equipment was left out to cheapen this installation and all of the apparatus was properly installed by Mr. S. C. Hoskins, foreman installer of the Stromberg-Carlson company, who was assisted by Mr. Leo Ham and Mr. W. Bessett of the Scotia Telephone company.

Again Mr. Higgins, as well as his numerous employees are to be congratulated upon the excellent and complete service-giving equipment they have provided for the citizens of Union, Missouri. Mr. Higgins has shown rare judgment in going ahead with these improvements at this time. It indicates that he has confidence in his company and the people it serves.

NEWSPAPER LAUDS PHONE SERVICE

(Reprinted from Huntington, Ind., Press)

Like the tradition of the theater that the show must go on regardless of what happens, so there is a tradition in telephone offices that service must be given to patrons no matter what may occur.

When the storm broke March 13 in all its fury huge timbers were hurled against the rear of the building in which the Huntington office of the Indiana Bell Telephone company is located. Windows were smashed and flying glass arched over the back of the switchboard on the heads and arms of the young women on duty. For an instant they left their posts and retreated but almost as quick they were back in their places and ready to care for calls.

James W. Forrest, manager of the telephone company, was at his desk downstairs. He immediately "cut in" the auxiliary storage batteries that are kept for emergencies when electric current is not available for ringing bells, the gas lights were lighted, Miss Louise Harmon, the chief operator, was hastily summoned and the telephone service went ahead as hundreds of persons called downtown or called friends and relatives to discuss the storm. Telephone calls reached a peak for recent months for about two hours after the storm.

Mr. Forrest said that only about thirty telephones were put out of service by the storm. A crew of repairmen worked through the night, seeking out trouble and remedying it.

ENGINEERING AND MANAGEMENT COURSE

(Continued from page 12)

parent that the selector picks out only one digit, whereas the connector can pick out the last two digits. In a 100-line exchange no selectors would be required, in a 1000-line exchange only a group of hundreds selectors, in a 10,000 line exchange a thousands and a hundreds selector, and in a multi-office exchange three groups of selectors would be needed, viz: an office selector a thousand selector, and a hundreds selector.

Figure 8 illustrates schematically the additional selectors required as the size of an exchange is increased.

The size of an automatic system is practically unlimited. In most cases, individual exchanges care for only 10,000 lines, although in districts where telephone development is exceptionally heavy as many as 20,000 lines may be served from one exchange.

In addition to its use for common battery main exchanges automatic equipment is available for Private Branch Exchange service, for small rural exchanges, and for practically every type of service that can be rendered by manual boards.

For those interested in a detailed study of automatic exchange theory, the writer commends Smith and Campbell's "Automatic Telephony," and Miller's "Telephone Theory and Practice" Book No. 3, both of which can be obtained through Telephone Engineer Magazine.

ROTARY CLUB HEARS TELEPHONE MAN

Members of the Madison, Ind., Rotary Club recently at their luncheon were entertained with an interesting talk by Samuel Tomlinson, president of the Decatur County Telephone company, who spoke on "The Growth of the Telephone System." Mr. Tomlinson outlined the beginning of the telephone and traced the development of this utility up to the present time. Accompanying Mr. Tomlinson to the Rotary luncheon was B. Y. Chambers, of Greensburg, a telephone executive, who formerly was head of the Madison Telephone company, and two members of the Greensburg exchange who provided delightful musical numbers.

Increase Your Sales

By

Advertising regularly in the new WHERE-TO-BUY section on Page 37. Use of this page will bring you quick and profitable results and will keep your name and products before telephone buyers at all times. Write for rates.

W. L. Runzel, President, brings to this organization 41 years' experience in the manufacture of this type of telephone equipment

Telephone and Switchboard Cords and Wire

May we quote you on your requirements?

RUNZEL CORD AND WIRE CO.

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The Home of the Perfect Cord

NEWS OF MANUFACTURERS

INTRODUCES NEW DUST FILTER

Realizing the menace of dust to the health of telephone employees and to telephone equipment, the Owens-Illinois Glass company of Toledo, O., has developed the new Dustop filter, which is now being used extensively by telephone companies to purify the air coming into their exchanges.

The new Dustop filter consists of glass wool treated with a special adhesive material packed in a reinforced fiberboard container designed to permit proper air flow.

As the air passes through the filter dust particles, pollens and bacteria adhere to the filtering material and only pure, clean air is emitted, it is claimed.

The glass wool used in the Dustop lends itself as a filter media, for it is non-corrosive, non-absorbant, and will not pack down under the pressure of flowing air. The glass fibres are packed into the container or frames by a mechanical process. They are laid in a jack-straw pattern with uniform density throughout, and the dust laden air passing through finds no clear channel.

The fineness and density of the filter media increases from the inlet to the outlet side, the front or more widely spaced fibers take their full load of coarse particles, while the finer and more closely packed fibers in the back form a barrier to small and finely divided particles. Practically all of the dust impinges on some viscous coated fiber.

LEICH CO. ANSWERS EMERGENCY CALL

The Leich Electric company of Genoa, Ill., recently emphasized the valuable service telephone manufacturers render operating companies when it answered an emergency call from Rantoul, Ill.

The switchboard cable in the Rantoul exchange caught fire late Wednesday morning, March 8. The Leich company received a long distance call at 11:30 a. m., advising them of the condition and at 2 p. m. an automobile with three men and all necessary materials including multiple cable was on its way to Rantoul.

It was found that the equipment had sustained considerable damage. Service was restored rapidly to important subscribers. The toll circuits were in operation before the Leich representatives arrived.

The progress of restoring service was slow because of the effect of chemicals used to put out the blaze.

LITTLEFUSE INSTRUMENTS

"Fine as a hair" is a crude comparison to the wire used in the new 1/100 ampere Instrument Littlefuses—30 times finer than a human hair—the finest wire in commercial use in the world, according to officials of the Littlefuse Laboratories, Chicago.

It is a platinum wire—invisible to the naked eye—and so fine that 13,300 can

be laid side by side on a one inch space. One pound of platinum drawn into this wire is 25,100,000 feet long, 4,750 miles, or more than the earth's radius.

One cubic foot would produce 6,340,000 miles, of wire, enough to encircle the earth 250 times at the equator; reach back and forth to the moon 13 times; and take a light beam 34 seconds to traverse its length, it is said.

It is 16,800 times heavier than air, yet floats like a spider web thread. It takes 300 of these wires to have a tensile strength of one ounce. Its cost is $11,280,000 per pound.

Instrument Littlefuses are made in 1/100, 1/32, 1/16, ⅛, ¼, ⅜, ½, ¾, 1, 1½, and two amperes capacity to protect any delicate instrument.

AUTOMATIC GETS NAVY JOB

Construction of an automatic telephone system at the naval ammunition depot, Oahu, Hawaii, has been awarded to the Automatic Electric company, Chicago, for $9,072.

The first steamship to be connected with ship-to-shore service was the Leviathan, of the United States Lines, in 1929.

FWD GETS BRITISH TRADEMARK

The Four Wheel Drive Auto company of Clintonville, Wis., has just received the official notification and registry certificate of their trademark by the British Patent Office. This certificate is dated December 13, 1932, and marks the culmination of twelve years of negotiations for a trademark with the English Government. It is one of the first trademarks to be allowed by the British Patent Office on a combination of letters, which, in this case, are FWD, arranged diagonally with the letter F above and to the left of the letter W, while the D is below and to the right. FWD, which is the trademark of the truck made by the Wisconsin truck company, means four-wheel-drive.

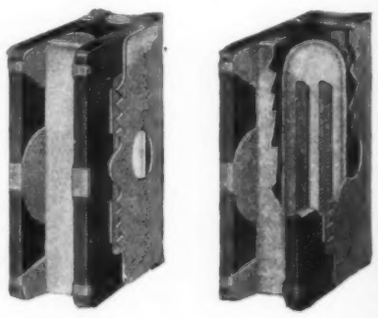
TEMPEROMETER MEETS WITH SUCCESS

The new Dillon Temperometer, an instrument which assures the correct temperature of solder for stirring and for wiping cable joints, has met with favorable success in the telephone industry, according to a report from the Dillon Manufacturing company.

Telephone companies in Texas, Minnesota, Illinois, Nebraska, Ohio, Pennsylvania and the Phillipine Islands have sent in orders for these instruments, it is said. In addition many inquiries have been received from companies and jobbers in other states and foreign countries.

BRACH'S NEW NEON ARRESTER

A new Neon lightning arrester for the protection of low voltage circuits such as telephone, fire and police signaling,



railway signaling, telegraph, radio broadcasting and other low voltage circuits, has been announced by the L. S. Brach Manufacturing Corp. of Newark, N. J.

(*Continued on page 38*)

Where-to-Buy Section

For the convenience of readers of Telephone Engineer

Climbers

Bashlin Duplex & Stephens Quality Linemen's Equipment. Send for catalog No. 32, Dept. E. P. O. Box 173.

W. M. BASHLIN, INC.
GROVE CITY, PA.

Test Sets

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LOW RANGE **FUSES**
INSTRUMENT LITTELFUSES 1/100, 1/32, 1/16, ⅛, ¼, ⅜, ½, ¾, 1 and 2 amps., positively protect meters, radios, amplifiers, etc. $100 Protection Guaranty. *Write today for instructive bulletin.*
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Write for No. 16 Catalog illustrating and describing Commutator truing stones, Commutator grinding tools, insulation meters, Electric solderers, portable blowers, face masks, and about 50 other Maintenance products.

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We Help You

Take space on this page and we help you find prospects and make sales. We're both benefitted.

TONG-TEST AMMETER BY MARTINDALE

In their March 1, 1933 sixteen-page supplement to their No. 16 general catalog, The Martindale Electric company introduced their "Tong-Test" Ammeter for AC and DC measurements.

Before the "Tong-Test" Ammeter was developed the only instruments available for measuring an alternating current without making an electrical connection with the circuit have been those operated from or on a "scissors" type split core transformer.

The Martindale "Tong-Test" instrument avoids the necessity for a current

transformer operated indicator, and thus by the elimination of windings reduces the possibility of electrical failure to a minimum. This instrument is of the split electro-magnet type, has no windings, is light and convenient to use and can be held and operated with one hand.

Special features of the "Tong-Test" Ammeter follow:

Readings can be taken of alternating or direct current.

The range can be altered easily by changing the detachable movement unit.

Absence of windings, rendering the instrument free from electrical defects.

Readings can be taken on DC

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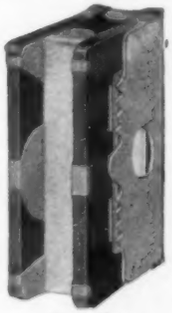
Lightning Arresters

Neon Lightning Arrester Units



Full Size

Interchangeable with carbon mica or carbon porcelain.

Better Protection
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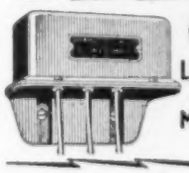

CHAPMAN
LIGHTNING ARRESTERS
MADE BY
MINNESOTA ELECTRIC CO
MINNEAPOLIS, MINN.

circuits even if the cable is of the single core armored type or is run in steel conduit.

The instrument is convenient to operate, one hand only being required.

The magnetic reluctance of the butt joint is so low by comparison with that of the movement gap that small variations due to dirt, etc., have practically no effect on the accuracy of indication.

The weight is only 2¼ pounds.

Complete details, description and prices may be obtained by writing the Martindaye Electric company, 1277 West 4th Street, Cleveland, Ohio.

NEWS OF MANUFACTURERS

(*Continued from page 36*)

This type arrester is small and compact (⅜" wide and 1¼" long) and is arranged to mount on ½" centers. It will fit in standard telephone arrester spring mountings and is interchangeable with carbon mica or carbon porcelain units.

It consists of a small glass tube containing two specially chemically treated metal electrodes in Neon Argon gas. The electrodes are separated approximately 3/32". The glass tube is encased in a metal and bakelite holder, forming a rigid unit capable of withstanding considerable rough handling.

Notwithstanding the wide spacing of the electrodes this arrester can be made to function at any predetermined voltage and below this operating voltage the insulation of the circuit remains constantly high. The arrester functions as a safety valve with great speed and while functioning has a low impedance resistance, it is claimed.

By using the Neon Argon arrester, clearer lines, freedom from grounding or partial grounding, a greater sensitiveness in protection, better insulation of circuits and instant return to a uniform normal condition will result, it is said. The operating parts are within a sealed glass chamber, protecting them from effects of insects, dirt and other foreign material.

These arresters may be tested either by placing them across the terminal of an induction coil or placing them across the spark plug of an automobile. A pocket test set, employing an induction coil and flashlight batteries to test the arrester without removing it from the mounting is available. The Brach company also furnishes mountings for outdoor or indoor locations.

ARTICLE MAKES SALE

After several unsuccessful attempts to sell residence service to a prospective subscriber in Wheeling, W. Va., C. V. Hooker became convinced that a more definite and practical sales appeal would be required if this prospect was ever to be converted into a customer. Several days later Mr. Hooker noticed an article in the morning newspaper dealing with a series of house robberies which had recently taken place in the city. Newspaper in hand, he went directly to the prospect and painted a convincing word picture of similar thefts that might be made, particularly in homes where the robber could see that they were not protected by telephone service. This timely use of the protection appeal not only resulted in securing a new friend and customer but also illustrated the resourcefulness of a good salesman in finding the proper appeal to clinch his sale.—*The Transmitter.*

RENEWS APPLICATION

The Northwestern Bell Telephone company has renewed its application for Interstate Commerce Commission approval of acquisition of the Tri-State Telephone and Telegraph company, which owns the St. Paul, Minn., telephone system. The Northwestern company operates the telephone service at Minneapolis and also an extensive system in Iowa, Nebraska, North Dakota, South Dakota and Minnesota.

HELD FOR USING SLUGS

Roy Hunter, 41, Newark, N. J., was placed on probation for two years by Common Pleas Judge Hartshorne for using quarter slugs in a coin telephone when he called a man in Cleveland to demand payment on a debt. Hunter had pleaded non vult to the charge of defrauding the telephone company.

Electrical Measuring Instruments . . .

They are the Telephone Man's most important tools. Like all tools, they suffer from wear and tear and accidental overloads.

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When an Audit is not wanted or even courted, there is the place where an audit should be made.

A good audit is an asset to the company in that it has a tendency to breed confidence and to stimulate conscientious work. A good audit is valuable information—is worth more than it costs.

A good auditor is a good adviser.

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